

Pennsylvania Nonpoint Source Management Program



Fy2001 Annual Report

(October 1, 2000 – September 30, 2001)

Commonwealth of Pennsylvania

Pennsylvania Department of Environmental Protection

Bureau of Watershed Management

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I. Introduction

Pennsylvania developed a Nonpoint Source Strategy that is based on the PA Department of Environmental Protection (DEP) and the NPS Liaison Workgroup visions. The **NPS Liaison Workgroup's Vision Statement** states:

Pennsylvania's Nonpoint Source Program, through partnerships with the citizens, agencies, and industries of the Commonwealth, will work to achieve appropriate water quality standards and protect beneficial uses of all surface and groundwater. To do this, the NPS Management Program will be used as a tool to control, prevent and remediate NPS pollution.¹

Included are both **long term goals** (more than five years) and **short term objectives** (five years or less) to establish flexible, targeted, iterative approaches to achieve and maintain beneficial uses of the waters of the Commonwealth. The Nonpoint Source Strategy includes seven program elements: NPS Vision, Long Term Goals with Short Term Objectives of the Commonwealth's Watershed approach, use of GIS technology, TMDLs, use of the NPS Liaison Workgroup, establishing environmental measures and indicators of progress and success. As stated in EPA Grant Guidance for 1997 and future years environmental results will be measured by: water quality improvements; NPS pollution load reductions; implementation of NPS controls and education and outreach efforts. The primary objective for Pennsylvania's Nonpoint Source Management Program is to consolidate the Section 319 requirements into a program that effectively reduces and prevents nonpoint source pollution in Pennsylvania.

Pennsylvania's Nonpoint Source Program is multi-faceted and has grown rapidly over the past ten years. An annual summary report of activities is done to meet the grant conditions we have with the EPA. Our goal is that this summary will both meet the EPA's requirements and help us to better document our progress in achieving NPS goals and objectives.

The NPS Action Plans are the major part of this summary. With the workgroup's expertise, each Action Plan outlines specific Milestones and Steps that Pennsylvania would take to implement the Nonpoint Source Management Program over the next five years. Some of the milestones have been updated and in some cases new ones have been added by the individual workgroups. In no cases have the milestones contained in the approved management plan been compromised. The individual Liaison Workgroups were asked to provide progress for their Action Plans.

This progress summary tries to focus on the NPS Management Program's long-term goals and short-term objectives in addition to the individual NPS areas of concern. We are including measurable results from NPS implementation projects funded in part with Section 319 monies. Some of these projects have been completed, while many are still ongoing. The NPS project sponsors provide this information to the program staff for documentation purposes and to record results as part of the Grants Reporting and Tracking System.

Pennsylvania's annual progress summary also includes major new and ongoing Commonwealth watershed initiatives. The Growing Greener Initiative, proposed new Water Resource

¹ PA NPS Management Program 1999 Update Part I., Section A

Legislation, Watershed Restoration Action Strategies and TMDL status are included. A few of Pennsylvania's many project success stories are also highlighted. Over the course of the past year many successful watershed restoration and protection projects have been implemented. The PA Department of Environmental Protection and Pennsylvania's Growing Greener Initiative websites, www.dep.state.pa.us and www.growinggreener.org respectively, provide a more complete snapshot of Pennsylvania's watershed restoration efforts.

(direct Link "Growing Greener")

www.PaWatersheds.org

www.WatershedWeekly.org

*II. Nonpoint Source Management Program-1999 Update*²

Long Term Goals and Short Term Objectives

Goal: Conduct restoration activities on all agricultural, construction, land disposal, silvicultural and urban nonpoint source impacted streams, for the purpose of attaining designated uses, by the year 2015; and conduct necessary restoration activities on all abandoned mine and hydrologic/habitat modified impacted streams, for the purpose of attaining designated uses, by 2025.

- (1) Use the Section 303(d) List of Impaired Waters, source water protection areas, and waters in need of special protection for future watershed prioritization. Encourage development of local watershed groups and interests to begin watershed protection and restoration activities.

The Section 319 grant program is using the Commonwealth's 303(d) List of Impaired Waters as the basis for targeting projects. The FY99 Incremental, FY2000, and FY2001 grants focused specifically on these waters. Watershed organizations have been formed and have been instrumental in seeing these projects completed. Many of these projects have been completed.

- (2) Develop and begin implementation of restoration plans for approved Total Maximum Daily Loads (TMDLs) for all waterbodies on the Section 303(d) List of Impaired Waters.

The DEP has developed a five-year plan for TMDL development. It is available on the DEP website. Several TMDLs have been approved. Several more TMDLs are proposed for completion by 2003. (See Appendices)

Goal: Achieve a 33 percent net gain in healthy, diverse, aquatic ecosystems by 2010, both by maintaining 1998 levels of such systems and by restoring degraded ones.

- (1) Focus the incremental Section 319 funds in FY1999-2000 on the 18 priority Category I Watersheds identified in the Unified Watershed Assessment. The remaining five Category I Watersheds will be priorities for attention in FY2001 and beyond.

Pennsylvania has successfully funded projects in the priority Category I watersheds. See the project accomplishments section.

- (2) In 1999 continue implementation of Pennsylvania's Watershed Restoration and Assistance Program, which provides state funding for watershed groups' restoration initiatives and demonstration projects.

The WRAP was a success. Many good local restoration, education and other nonpoint source watershed projects were funded, including thirty-one projects in

² Part I. Section A PA's NPS Strategy

1999. WRAP was discontinued with the advent of the Watershed Protection and Environmental Stewardship Funds "Growing Greener".

Goal: Coordinate all watershed-based state and federal programs to deliver consistent policies and services to local watershed protection and restoration efforts.

- (1) Continue using the NPS Liaison Workgroup to communicate on and advise NPS programs and issues.

The NPS Liaison Workgroup which includes representatives of federal, state and local organizations meets at least two times a year to provide input to the NPS Annual Report and provides a forum for discussion on current NPS issues.

- (2) By 2000, publish a handbook for citizen volunteers on conducting water monitoring and watershed assessments for local and state use.

The CVMP Handbook was completed and published in February 2001. Entitled *Designing Your Monitoring Program: A Technical Handbook for Community-Based Monitoring in Pennsylvania*, the manual was prepared by the River Network and the PA DEP, Bureau of Watershed Management, Citizens Volunteer Monitoring Program.

- (3) Establish and expand the use of alternative monitoring by Pennsylvania's ten Senior Environmental Corps and other volunteer groups working in conjunction with DEP by 2001.

EASI and other volunteer monitoring groups have developed a close working relationship with the PA DEP CVMP. Volunteer water quality monitoring is an important component for many local restoration projects. A Volunteer Monitoring website has been created to provide a clearinghouse for information. This was a major goal of the Keystone Watershed Network. www.dep.state.pa.us/directLink/VolunteerMonitoring.

- (4) Incorporate FY96 EPA Grant Guidance regarding Nine Key Elements into the Commonwealth's Program to achieve "Enhanced Benefits Status" in 1999.

The NPS Management Plan 1999 Update incorporated these elements. Pennsylvania was the first state in EPA Region 3 to have an EPA approved updated NPS Management Program.

Goal: Increase by 5 per year the number of local watershed groups statewide to develop and implement a comprehensive watershed plan to conserve, protect and restore beneficial uses of all surface and groundwater resources.

- (1) In 1999, Pennsylvania DEP and partners will conduct a watershed conference on watershed management.

The first state watershed conference was held in Spring 1999 in State College. Several conferences to bring together all state organizations have been held since.

- (2) In 1999, Pennsylvania DEP and partners will conduct a conference for watershed and conservation groups focusing on Abandoned Mine Drainage and remediation of watersheds impaired by AMD.

These conferences have been held on a yearly basis since 1999.

- (3) In 1999, the Citizens' Volunteer Monitoring Program will conduct three workshops for monitoring groups (monitoring of AMD, streambank restoration and lakes).

Workshops were conducted in several locations, and continue for the benefit of local monitoring groups.

- (4) In 1999, DEP will conduct four workshops on state and federal funding programs to address polluted runoff. These workshops were started by the 319 Program in 1999. In January of 2000, 26 workshops were held across the state to explain Growing Greener. Workshops are held in each of the six regions to announce/explain the goals of the Growing Greener Grants which also include information on Section 319.

One of the primary goals of the statewide watershed conferences, AMD summits, and meetings for local watershed organizations is to address funding issues.

Goal: Develop new and utilize existing sources of funding for remediation/restoration of pollution problems associated with NPS.

- (1) In 1999, implement Agri-Link as a source of low interest loans to farm owners or operators to implement BMPs in nutrient management plans.

Approximately \$853,000 has been provided to farmers between January 1999 and June 2002.

- (2) Increase by 10 percent the use of PENNVEST Low Interest Loan Program to address the public health and environmental needs from malfunctioning onlot sewage disposal systems by 2003.

The % change will be determined after 2003.

- (3) Increase by 10 percent the use of PENNVEST Low Interest Loans to construct, improve or rehabilitate public stormwater facilities by 2002.

The % change will be determined after 2002.

- (4) Revise Pennsylvania's Clean Water State Revolving Fund (CWSRF) Intended Use Plan to address funding of NPS activities through the CWSRF and develop mechanisms to market the CWSRF for addressing NPS problems in 2000.

Some general language has been included in the CWSRF Intended Use Plan for the past three years to highlight availability of CWSRF funding for addressing NPS

problem areas. To date little interest has been expressed to DEP and PENNVEST from those engaged in finding financial support for NPS. This is due to the extent of state and federal grant programs available to fund NPS-related activities. The DEP and PENNVEST remain open to considering NPS CWSRF funding proposals.

- (5) Develop an integrated priority ranking system to assist in making CWSRF project funding decisions for point source and NPS activities in 2000.

There is no immediate requirement to refine the existing priority rating system since NPS activities are not high priority for using CWSRF funding.

- (6) In 1999, implement the use of the Drinking Water State Revolving Fund set aside funds to enhance source water protection activities and protect human health in areas where NPS is a major problem.

A major portion of DWSRF Set-aside funds is being used to support local source water assessment and protection activities. The FY02 DWSRF Set-Aside workplan provides details on these activities.

- (7) In 1999, introduce "Growing Greener" budget initiative to redirect existing funding towards additional NPS projects and to enhance local abilities to manage on a watershed basis.

The G2 Initiative is a success. Projects are helping improve water quality and establish new watershed organizations in PA. Three rounds of grants have been awarded through 2001. The PA DEP alone has awarded \$86.6 million in Growing Greener Grant awards.

- (8) In 2000, update and expand existing fact sheet, "Potential Funding Sources for Watershed Groups".

Additional information was compiled for use in updating the fact sheet. Copies of current fact sheets are available on the DEP website www.dep.state.pa.us.

- (9) By 2000, establish an approved Conservation Reserve Enhancement Program (CREP).

The PA CREP program was sent by the governor to the Secretary of the U.S. Department of Agriculture in January 2000 and subsequently approved. CREP has benefited many farmers in the 20-county program area in the Susquehanna River basin. Under this program farmers will receive up to \$210 million in payments to keep highly erodible land and riparian areas out of production. The initial sign-up began in June 2000. See Appendices for more information.

Goal: By 2001, use Geographic Information System (GIS) technology to show stream assessments, locate BMPs installed and report and track environmental improvements. Use as an interface with other data to develop TMDLs.

- (1) Insure that the Nonpoint Source Program Geographic Information System is a component of the Department's system, compatible with other agencies involved in the development and use of this technology. Use GIS to prioritize watersheds for assessment. Develop stream and lake GIS coverages in 1999.

GIS coverages have been developed for project locations, unassessed waters program status, and lakes. GIS is an important part of the NPS Implementation program and its partnership with many other programs.

- (2) Evaluate all free-flowing streams in the Commonwealth using a modification of EPA's Rapid Bioassessment Protocol by the year 2003.

The DEP's Unassessed Waters Program, initiated in 1997, is ahead of its goal. After four monitoring seasons from 1997 through 2000, assessments for 75 watersheds totaling 45,234 stream miles (54%) have been completed. The completed areas are shown on the DEP website on a map and table. This [map and table](#) also shows you the assessment watersheds that are in progress and the ones DEP's Unassessed Waters (UW) biologists proposed to conduct during the UW 2001 survey season. www.dep.state.pa.us

Goal: Rely on incentives, assistance and education, as well as, the existing regulatory programs to emphasize the conservation of existing resources in site design and avoidance and to comprehensively address NPS problems in watershed restoration plans.

- (1) By January 2000 begin implementation of Pennsylvania's new Conservation Reserve Enhancement Program (CREP) including information and outreach.

CREP signups began in June 2000. More details are provided in the Appendices.

- (2) Provide financial incentives for infrastructure projects that utilize design alternatives that promote NPS pollution prevention through conservation of resources. Make funding commensurate with level of protection provided by nonstructural BMPs.

This is an ongoing challenge. The Growing Greener Initiative and Section 319 funding are helping to promote demonstration projects that utilize alternative designs.

- (3) In 1999, amendments to Pennsylvania's antidegradation regulations including requirements that DEP assure that BMPs for nonpoint source controls be achieved, will be presented as final rulemaking to the Environmental Quality Board.
- (4) Final regulatory changes to Pennsylvania's erosion control regulations (Chapter 102) to provide flexibility in implementing BMPs, clarify permitting and planning requirements, and integrate the federal NPDES Stormwater Construction Permits into Pennsylvania's existing regulatory program will be completed in 1999.

Changes to the Chapter 102 regulations to incorporate NPDES requirements have been completed.

- (5) Implement the Department's Confined Animal Feeding Operations (CAFO) strategy to ensure CAFOs are constructed and managed in an environmentally sound manner while also ensuring that agricultural production is profitable, economically feasible and based on sound technology and practicable production techniques.

The PA DEP has adopted a final CAFO strategy. It is being implemented in cooperation with the PDA and SCC.

Goal: By 2001, develop or expand six non-point source education and outreach efforts. Incorporate public input into all phases of the program.

- (1) Continue the development and implementation of the Statewide Education Program using assistance from the Pennsylvania Association of Conservation Districts Education Office and the League of Women Voters of Pennsylvania.

The FY2000 and FY2001 319 grants were funded. The PACD Education Office and the PA League of Women Voters, Water Resource Education Network (WREN) projects are continuing to be a very effective way to empower watershed associations, conservation districts and grassroots organizations to provide information on nonpoint source pollution and watershed protection.

- (2) Continue to promote Farm-A-Syst Programs to provide a mechanism for a farmer to evaluate the environmental health of his/her farm.

The PSU Cooperative Extension county agents and PSU School of Agriculture are promoting the Farm-A-Syst program throughout the state.

- (3) In 1999, establish a delivery system for Home-A-Syst to enable homeowners to assess the environmental health of their home and daily living.

Home-A-Syst was distributed to county conservation districts and Penn State Cooperative Extension Service (PSCE) and is available to the public through workshops and the DEP website. DEP's Regional Offices of Pollution Prevention and Compliance Assistance also work with PSCE as needed to deliver Home-A-Syst.

- (4) In 2000, convene a statewide conference or a series of regional conferences to focus on innovative, non-regulatory solutions to nonpoint source pollution based on economic incentives, voluntary initiatives, and education.

Two statewide watershed conferences were held since January 2000. Both conferences covered a wide range of nonpoint source and watershed restoration related topics. Regional state forums have also provided many opportunities to address these issues.

- (5) By 2000, develop a user-friendly publication on Section 319 projects that document the environmental improvements accomplished by the implementation of these projects. Publish and use for outreach and as an overview of innovative technologies. Post on web and update annually.

Completed. The DEP publication *Local Solutions to NPS Pollution* was revised and distributed to the public with the 2001 Earth Day and Pennsylvania State Envirothon held in May 2001.

- (6) By 2001, establish a Clearinghouse for watershed groups, municipalities, counties, agencies, consultants and educators on technical, financial and communication resources available on watershed protection and restoration.

The PA DEP, Growing Greener Initiative, and POWR all provide clearinghouses for public information through their respective websites, www.dep.state.pa.us , www.growinggreener.org , and www.pawatersheds.org .

Goal: Assure that cost-effective and reasonable Best Management Practices for nonpoint source pollutant control be achieved.

- (1) Existing regulatory requirements contained in the Department's regulations (Chapter 101, 102, 105), Nutrient Management Act, Clean Streams Law and programs such as the Dirt and Gravel Roads, Nonpoint Source Management, Watershed Restoration and Assistance Program, Coastal Nonpoint Source Pollution Control and others will continue to govern BMP implementation.

The Chapter 101, 102, and 105 regulations and the Nutrient Management Act (Act 6 of 1993) provide technical and financial assistance to counties to implement the program requirements. The Dirt and Gravel Roads, Nonpoint Source Management, Watershed Restoration and Assistance, and Coastal Nonpoint Source Pollution Control programs have provided demonstration project and BMP implementation funding. The Watershed Restoration and Assistance Program (WRAP) was a precursor to the Commonwealth's Growing Greener Initiative. WRAP was completed in 2000.

- (2) By 2001, distribute the BMP Handbook for developing areas to all new municipalities in Pennsylvania. Provide funding for training to all municipalities by 2001, and put the Handbook on the web by 2001.

Completed. The PACD distributed the BMP Handbook to municipalities. The BMP Handbook is available to the public for purchase by going to the PACD website at www.pacd.org . Mini-Grants for workshops.

- (3) By 2002, provide statewide interagency training on the Stream Corridor Restoration Handbook.

The Stream Corridor Restoration Handbook, a USDA-NRCS publication, is used for workshops and training sessions for agencies and organizations involved with designing and implementing stream restoration projects. It was distributed to

technical staff in the DEP, USDA-NRCS, USFWS, ACOE, Canaan Valley Institute and other agencies and organizations. The Stream ReLeaf workshops also provided copies of the Stream Corridor Restoration Handbook to all participants.

Goal: By 2015, implement Pennsylvania's 15-year program strategy for the Coastal Nonpoint Program.

- (1) By January 2000, prepare and submit a 15-year Program Strategy that describes Pennsylvania's overall approach and schedule to ensure implementation of the 6217 management measures.

The 15-year Program Strategy is in draft. A final draft is expected in 2002.

- (2) By January 2000, develop the first 5-year implementation plan that details methods and programs to be used to achieve implementation of the management measures.

The 5-year Implementation Plan is in draft. A final draft is expected in 2002.

Environmental Measures And Indicators Of Progress And Success³

Water Quality Standards (WQS) are the combination of water uses to be protected, and the general and specific criteria (i.e. levels of parameters) that need to be maintained or attained to prevent or eliminate pollution. WQS are an important element of Pennsylvania's Water Quality Management Program because they set the general and specific goals for the quality of our surface waters. Pennsylvania's WQS are found in the Department's rules and regulations. The water uses and water quality criteria are incorporated into Chapter 93 "Water Quality Standards." Guidelines for toxic parameters are found in a Statement of Policy, Chapter 16. Wastewater treatment requirements, including Special Protection (anti degradation), and the point source control of phosphorus to lakes, ponds, impoundments and free flowing streams, are located in Chapter 95.

Designated Uses

In Pennsylvania, designated water uses that are protected statewide include fish and aquatic life; public, industrial, livestock, wildlife and irrigation water supply; and boating, fishing, water contact sports and aesthetic recreational uses. Some waters may also be designated for Special Protection, as well as, for navigation uses. Water quality criteria are established by Pennsylvania to protect the most sensitive water use of specific waters. When the most sensitive use is protected, all other less sensitive uses are also protected. Usually the most sensitive protected use is either fish and aquatic life or water supply. In addition, bacteria criteria applicable to all waters are designed to protect recreational uses.

Biological Assessment

The Commonwealth's plan for achieving a comprehensive statewide assessment of its surface waters includes implementation of a program to evaluate all unassessed free-flowing streams by the year 2003. All waters will then be reassessed on a five year cycle. The Department has developed a strategy for these assessments which involves preliminary screening of each watershed followed by a field-level biological assessment. Full-scale field work for this unassessed waters project began in 1997. This is a cooperative effort, with assessments being conducted by the Department's six field offices, the Pennsylvania Fish and Boat Commission, the Susquehanna River Basin Commission, the Interstate Commission on the Potomac River Basin, and Bureau of Watershed Conservation staff. According to the February 14, 2002 draft summary of the Surface Water Assessment Program assessments have included sampling at more than 7,749 stations representing almost 53,718 stream miles (65 percent of Pennsylvania's total 83,240 stream miles).

The unassessed waters process uses a biological screening protocol to establish whether aquatic life uses are impaired. Where uses are found to be impaired, or where the screening does not yield definitive information, more detailed assessments are conducted to identify the NPS and/or PS responsible for the problem. Biological screening is conducted on wadeable waters using a modification of EPA's Rapid Bioassessment Protocol (RBP) which includes field identification of benthic macroinvertebrates to the family level and an RBP habitat assessment. Each biological screening results in an Assessment Summary for input to the 305(b) assessment database, and

³ NPS State Management Program 1999 Update

uses Geographic Information Systems (GIS) to identify the location of waters with obvious water quality impairment and those with no obvious impairment. TMDLs will be developed for impaired watersheds. Watersheds with approved TMDLs will receive priority for 319 funding.

*III. Measurable Environmental Results*⁴

Nonpoint Source Management Program MERs

Environmental results as measured by water quality improvement from nonpoint source controls and by nonpoint source pollutant load reduction will be evaluated as part of the assessments done in conjunction with Pennsylvania's 305(b) Report. The measures accomplished by implementation of nonpoint source (NPS) controls and by public education, awareness and action will be evaluated by the six NPS Liaison subworkgroups. Each of the six NPS Liaison subworkgroups meet annually to discuss what the organizations represented by the various group members have accomplished during the previous year. They review and update the action plan for that category of the management program. Progress is included in the Annual Report to EPA. Pennsylvania will update the NPS Management Program every five years.

MERs listed in parts a and b will be reported in the Department's 305(b) report as well as program and project summaries. MERs listed in parts c and d will be reported annually in the program annual report to EPA. Specific implementation activities and milestone accomplishments will be reported. Summary annual reports from the Waterways, Wetlands and Erosion Control, Stormwater Management, Dirt and Gravel Road, Chesapeake Bay and others will be incorporated in Part c, Implementation of Nonpoint Source Controls.

A. Water Quality Improvement from Nonpoint Source Controls⁵

Section 319 NPS project implementation measures water quality improvements. See Appendices for FY99, 2000, and 2001 projects where measurable results have been documented by project sponsors and reported. This information is documented in the Grants Reporting and Tracking System (GRTS) when project sponsors report it.

B. Nonpoint Source Pollutant Load Reductions⁶

The following applies to Susquehanna River basin watershed monitoring.

Current USGS Sedimentation Studies in the Bay and the Tidal Tributaries

The USGS study is in its early stages. The purpose of the study is to evaluate the historical sediment record and water quality trends that provide a better understanding of the anthropogenic impacts upon the Bay. What is hoped to be gained from the study is better understanding of sediment sources and transport, how changes in landuse affect changes in sedimentation rates and understanding how different components (e.g., tributaries, shorelines, marshes, shoals, etc) affect sedimentation. Initial areas to be studied include the Pokomke River and Pokemoke Sound followed by the Potomac River. An additional goal of the study is to permit transferability of knowledge to other areas of the Bay. I expect follow-up reports on this study as the work progresses. I'm hoping that Information from this study may help determine what part resuspension of Bay sediments versus sediment from the rivers plays in Bay water clarity issues.

⁴ From PA NPS Management Program 1999 Update – Part I., Section A.9.

⁵ PA 305(b) report is primary means of reporting this information.

⁶ PA 305(b) report is primary means of reporting this information.

Recommendations for Sediment Management in the Susquehanna River Basin

With funding from the Chesapeake Bay Commission (CBC), the Susquehanna River Basin Commission (SRBC) convened the Sediment Task Force, which was given the task of evaluating sediment loads in the Susquehanna basin and providing recommendations on ways to maintain the trapping efficiency of the dams on the lower Susquehanna. The concern is that as the reservoirs fill, sediment loads to the Bay will increase, resulting in further degradation of the Bay ecosystem. An important consideration for reducing sediment loads is that the Susquehanna River has the capacity to store large (and as yet undetermined) quantities of sediment. Studies of river systems in the mid-west suggest that it could take decades to transport the already existing bed loads within a large river such as the Susquehanna. This suggests that even if no new sediment were washed off the land starting today, it may take many years, and most likely, decades before the existing sediment stored in the river channel is flushed from the basin and a significant decrease in sediment loads delivered to the Bay is actually realized. In other words, it is unwise to expect any short-term solutions to reducing the sediment loads reaching the reservoirs.

Sediment Task Force findings:

- Historical high sediment loads were about 9 million tons per year (early 1900's)
- Current sediment loads average about 3.1 million tons per year
- Reservoir sediment trapping efficiency is about 50-70%
- Net delivered load to the Bay is about 0.9 to 1.1 million tons per year. This rate is roughly equivalent to loads that would be anticipated from an all forested watershed.
- *Note: About 40% of the sediment load in the Susquehanna is contributed from land downstream of Harrisburg. (40% of the load is contributed by the lower 12% of the watershed) --- this is from a previous meeting of the group*
- 259 million tons of sediment are stored in Conowingo Reservoir
- Remaining storage capacity in Conowingo reservoir is about 43 million tons
- Anticipated life of Conowingo storage capacity is 17-20 years at 70% trapping efficiency
- Sediment is scoured from Conowingo Reservoir when river flows exceed about 400,000 cubic feet per second. Scour increases sediment loads to the Bay
- Since 1900, 14 major scour events have occurred
- About 95% of the sediment from the Susquehanna remains in the upper Bay (above the Bay bridge)

Potential Impacts to the Bay:

- 100% to 250% increase in sediment load from the Susquehanna River
- 20% to 70% increase in phosphorus load
- Negligible (2%-3%) increase in nitrogen Load
- Physical impacts on eggs, larvae, and juveniles
- Aggravation of phosphorus effects in middle Bay during scour events
- Physical impacts on navigational channels – increased dredging

Recommendations for management of sediment within the reservoir focused on four areas: Upland management (principally agricultural and urban lands), Riverine Management, and Reservoir Management. The more significant recommendations include:

Upland Management – Agricultural Lands

- Promote clean water practices along with soil productivity
- Evaluate soil loss tolerances on water quality response
- Conservation on Highly erodible lands
- Better integration of sediment planning with nutrient management
- Promote partnerships, education and outreach

Upland Management – Urban Lands

- Promote innovative design measures
- Watershed management planning
- Stormwater BMPs which meet 80% settling performance
- Education and outreach
- Improve existing stormwater programs

Riverine Management Recommendations

- Stream Restoration and stabilization including developing restoration and assessment guidelines, utilizing natural stream channel design methods, using NPDES Phase II to promote restoration, incorporating techniques and strategies into land development programs, and education and outreach
- Riparian Buffers
- Natural and constructed wetlands
- Improve monitoring and sediment transport assessment
- Assessment of sediment trapping capacity

Reservoir Management Recommendations

- Sediment fixing, sediment bypassing and dam operation modification all considered as impractical
- Dredging feasibility study
- Sediment characterization study

The STF workgroup has identified several areas where data and understanding are lacking:

- Better understanding of sediment load from upland sources, bank failure, bed load transport, and reservoir scour.
- Better characterization of sediment transport and delivery
- Assess storage and remobilization from banks and channels
- Assess delivery from overland sources
- Characterize and, silt and clay fractions
- Determine sediment residence time by source
- Develop sediment budget process
- Determine sediment residence time by source
- Collect data emphasizing channel processes and sediment delivery
- Document select field parameters/indicators
- Stormwater event sampling at existing state water quality networks
- Better monitoring at proper scale

Monitoring enhancements

- Better understanding of condition of riparian buffer zones as source of sediment
- Uniform monitoring of stream channel stability and stream bank conditions
- Utilization of watershed volunteers for monitoring

Conclusions

- Sediment management has a long-term horizon
- Realistic 2010 projection: full implementation
- Sediment management is really water energy management

C. Nonpoint Source Controls Implementation

All of the following have either been completed or are ongoing. See the NPS Action Plans for details where none are provided here.

(1) Best management practices implemented in targeted watersheds.

Many local, state, and federally funded initiatives are helping best management practice implementation in priority watersheds. The Section 319 program targets resources to areas identified in the PA DEPs 303(d) list as water bodies impaired by nonpoint sources of pollution. The Commonwealth's Growing Greener Initiative provides the funding and technical assistance to implement watershed restoration and protection projects statewide. The USDA, NRCS implements the EQIP program in priority watersheds. The CREP program focuses efforts on the 20-county lower Susquehanna River basin, the area where the greatest impact on nutrient and sediment load reductions can be achieved by implementing practices on highly erodible land and near-stream areas.

(2) Approved or certified management programs written to address specific NPS issues.

The Act 6 of 1993 Nutrient Management Act program is implemented through a partnership between the DEP, State Conservation Commission, Pa. Department of Agriculture and county conservation districts. Fifty-seven county conservation districts have delegated agreements and employ nutrient management specialists. More information is included in the *Agricultural Action Plan*.

(3) Approved or certified management programs implemented to address specific NPS issues.

Pennsylvania's Nutrient Management legislation took effect on October 1, 1997. The Act requires farms with two or more AEU per acre to prepare and implement nutrient management plans. The State Conservation Commission (SCC) was given the responsibility for developing regulations establishing minimum criteria for nutrient management plans that incorporate best management practices. The Act directs the SCC to provide financial assistance such as loans, loan guarantees, or grants for implementing nutrient management plans. Availability of state funds dictates the amount of financial assistance provided. The Act also required the PA DEP to assess the impacts of non-agricultural nonpoint pollution sources.

Fifty-seven (57) counties are delegated authority to implement the Nutrient Management Law in the state, and each has a certified nutrient management specialist. Counties without delegation agreements are primarily in northern counties where crop and livestock agriculture is not the primary industry.

The Nutrient Management Regulations are provided in PA Code, Title 25, Article Chapter 83, the Nutrient Management Certification program in part of PA Code, Title 7, Section V and I.

(4) Percent of watersheds covered by best management and/or watershed plans.

The highest priority for Pennsylvania's NPS Implementation program is watersheds with documented impairments. The FY2003 319 grant will focus restoration efforts where TMDLs have been approved or are being prepared. Restoration projects funded under the FY99 and 2000 Section 319 program and the USDA EQIP program focused on priority watersheds using different criteria.

(5) Percent of watersheds covered by best management and/or watershed plans that have been implemented.

A good indicator for watershed plan coverage is WRAS coverage. Approximately one third of SWP watersheds in Pennsylvania have a WRAS developed. In each of these watersheds there are watershed restoration projects being implemented in any number of smaller sub-basins. In addition many watersheds outside of areas where WRASs are developed have seen watershed restoration and protection projects implemented, especially in the north-central and northeastern parts of the state.

(6) New technology that re-uses, reduces or recycles and therefore prevents specific NPS pollution.

New and innovative technologies have been implemented in AMD restoration, agricultural waste management, and any number of other nonpoint source remediation projects. Technologies that are not necessarily new, but may not have received widespread acceptance, are promoted by DEP's Pollution Prevention initiatives.

The DEP Bureau of Environmental Sustainability includes Technology Development and Pollution Prevention and Energy Efficiency initiatives, in addition to the Growing Greener initiative. The program objectives are to become aware of and disseminate new information on energy efficiency technologies. A new Technology Clearinghouse is now available through the DEP website.

(7) Total dollars for reimbursement requests from municipalities for NPS implementation expenses.

(8) Percent of CWSRF funds used to address NPS problems.

(9) Opportunities for expanded use of CWSRF funds to address various NPS categories.

There has been little interest expressed to the DEP and PENNVEST from those engaged in finding financial support for NPS control efforts so far. There are several state and

federal grant programs currently available to fund NPS-related activities. The DEP and PENNVEST are still open to considering CWSRF funding proposals for nonpoint source activities.

(10) Numbers of Brownfield sites restored.

(11) Number of farm operations using Integrated Pest Management.

(12) Number of new mine permits issued which will incorporate re-mining of abandoned mine lands.

2000 AML Reclamation Summary: AML Reclamation by industry started 53 re-mining projects.

(13) Number of orphan oil and gas wells plugged or with plans for remediation.

(14) Number of abandoned mine sites backfilled.

2000 AML Reclamation Summary: At least sixty-seven (67) projects were started under the federal Title IV program to address Health and Safety concerns.

(15) Number of AMD passive treatments projects implemented.

Many AMD passive treatment systems have been constructed through several programs. The Section 319 NPS program started 14 projects, including AMD passive treatment systems, during 2000.

(16) Number of AMD projects completed under the Bond Forfeiture Program.

2000 AML Reclamation Summary: Seventeen (17) projects were started under the Bond Forfeiture program.

D. Public Education, Awareness and Action

All of the following have either been completed or are ongoing. See the NPS Action Plans for details where none are provided here.

(1) Participation in various nonpoint source activities, such as citizen monitoring and watershed restoration activities.

(2) NPS information on BMPs, technical assistance, research or financial assistance available on WEB sites.

The PACD, DEP, DCNR, and county conservation districts all provide information through their respective sites.

(3) BMP demonstration sites established.

Section 319 funding have helped fund several demonstration sites:

- Stormwater and Urban BMPs, Erie County
- SE PA RC&D Livestock Watering Facilities
- A.R. Saxman Park E&SPC, Stormwater Management and Stream Restoration, Westmoreland County Conservation District
- PA Dirt and Gravel Roads Program
- Sustainable Development in an Inner City watershed, Philadelphia County
- Villanova University Stormwater Management Wetland, Montgomery County
- Headwaters RC&D Sustainable Forestry Initiative, Northern tier counties

(4) Number of municipalities in compliance with the Stormwater Management Act (Act 167).

Approximately 700 municipalities in the Commonwealth are involved with Act 167 planning. There is approximately 85% compliance with municipalities.⁷

(5) Increase in number of watershed associations.

Approximately forty-four watershed associations were started during 2000-2001.

(6) Number of fact sheets, information circulars, or videos developed on NPS management.

Many have been developed for different NPS management issues.

⁷ DEP Stormwater Management program

(7) Number of information/education/technical assistance outreach activities conducted to ensure understanding and use of NPS management materials.

Many have been conducted through county conservation districts, DEP Regional Offices, the PACD and the League of Women Voters –Water Resource Education Network sponsored projects.

(8) Number of NPS Management Manuals (Manure Management Manual, Stream Corridor Management Manual, Passive Treatments Manual, etc.) developed and implemented jointly by Pennsylvania agencies and organizations.

The following are being revised, developed or implemented:

- PA Manure Management Manual for Environmental Protection,
- Stream Corridor Restoration Manual, and
- A new Keystone Stream Team/ACB Guidance Manual.

Project results from the EPA/State Grants Reporting and Tracking System

Goals and accomplishments that have been reported by project sponsors for PA's FY99 and FY2000 Section 319 NPS grants are shown below. Some projects have been completed in their entirety while many projects are still being completed and have yet to document the projects' final results.

FY99 Section 319 Projects

Watershed	Project	SWP⁸	Goals / Accomplishments
Mill Creek, Bucks County	35	2E	Watershed assessment, restoration plan developed.
Silver Creek, Bucks County	36	2E	7 sedimentation chambers installed, 100 ft stream channel restored
Pine Creek, Bucks County	37	2F	Watershed assessment
Core Creek Restoration, Bucks County	38	2F	1,900 ft stream bank, shoreline protection
Upper Schuylkill River, Schuylkill County	40	3A	Watershed assessment.
Wabash Creek, Schuylkill County	41	3A	1 acre wetland created to reduce Fe, Al loadings
Sacony Creek, Berks County	42	3B	6,500 ft stream bank fencing
Maiden Creek, Berks County	43	3B	600 ft stream bank restoration, 1,000 ft stream bank fencing
Manatawny/Hay Creek, Berks County	44	3C	Watershed assessment, local group formation.
Perkiomen Creek, Montgomery and Berks Counties	45	3E	3,300 ft stream bank fencing
Paper Mill Run Ph II, Montgomery County	46	3F	0.4 miles riparian buffer restoration
Wissahickon Creek, Philadelphia and Montgomery Counties	47	3F	Watershed assessment, water quality plan development.
Mill Creek, Montgomery County	48	3F	1 acre wetland restored
Crum Creek, Delaware and Chester Counties	49	3G	Watershed assessment
Cobbs Creek, Philadelphia County	50	3G	770 ft stream bank stabilization, 1 acre wetland created
Tookany Creek, Montgomery County	51	3J	1,100 ft stream bank restored, riparian buffer planted

⁸ PA State Water Plan basin number.

Watershed	Project	SWP ⁸	Goals / Accomplishments
Tacony Creek, Philadelphia County	52	3J	1,400 ft riparian restoration
Shamokin Creek, Schuylkill County	53	6B	Watershed assessment
Powell / Armstrong Creeks, Dauphin County	54	6C	3,900 ft stream bank fencing
LeTort Spring Run, Cumberland county	55	7B	500 ft riparian buffer, 500 ft stream channel restoration
Chickies Creek, Lancaster county	56	7G	5,260 ft riparian habitat restoration and stream bank fencing
Speedwell Forge Lake, Lancaster County	57	7J	Watershed assessment in Lebanon, Lancaster counties.
Conestoga River, Lancaster county	58	7J	Watershed assessment, watershed coalition formed
Pequea/Mill Creek, Lancaster County	59	7J	21 miles riparian buffer, 6 acres wetlands
Lititz Run/Millport Conservancy, Lancaster County	60	7J	1,200 ft stream channel restored, 2,400 ft riparian buffer restored, 3 acres wetland created
Anderson Creek, Clearfield County	61	8B	Watershed assessment and restoration plan.
Hubler Run AMD, Clearfield county	62	8C	Stream improved by decreasing metals loading and increasing pH from 3/5 to 5/6 range.
Rotational Grazing, Southwestern PA	63	8C, others	737 acres pasture created; 17,000 ft stream bank fencing; 679 tons soil erosion reduced.
Beaver Run, Jefferson County	64	17C	Reduced Al, Fe, Mn loadings by 90%
Yellow Creek, Westmoreland County	65	18D	5 acre limestone treatment ponds and wetlands created
Quemahoning Creek, Somerset County	66	19D	Watershed assessment
Sewickley Creek, Westmoreland County	67	19D	4,200 gpm AMD discharge treated.
Sewickley Creek, Westmoreland County	68	19D	0.5 acre wetland created, 1,000 ft stream channel restored.
Raccoon Creek, Washington County	69	20D	100 gpm AMD discharge treated
McLaughlin Run, Allegheny County	70	20F	150 ft stream bank stabilized and planted; 1,200 ft riparian buffer established; 215 ft pasture fenced.
Upper Juniata River, Blair and Huntingdon Counties	71	11A, 11B	125 acres pasture created; 21 acres riparian habitat restored; 14,700 ft stream bank fenced.

FY2000 Section 319 Projects

Watershed	Project	SWP id	Goals / Accomplishments
Pinkertons and Robinson Run, Allegheny County	22	20F	0.5 mile AMD-impacted stream restored
Nesquehoning Creek, Carbon County	23	2B	19,000 lb/day metals loading reduction, 2 acre wetlands created
Tangascootack Creek, Clinton County	24	9B	1.5 acre wetland created
Indian Creek, Fayette County	26	19E	0.4 ton/yr, 8 ton/yr, 17.2 ton/yr metal load reductions
Whiteley Creek, Greene County	27	19G	6 acres wetlands to treat AMD discharge
West Branch Octoraro Creek, Lancaster County	29	7K	2.3 acre wetland created; 1,750 feet stream channel restored
Perkiomen Creek, Berks County	30	3E	0.5 mile riparian habitat restored
Tuscarora Creek, Juniata County	31	12B	10 miles stream bank fencing; 5 acres wetlands created
Conococheague Creek, Franklin County	32	13C	32 acres riparian corridor restored
Octoraro Creek, Lancaster and Chester Counties	33	7K	18 miles stream bank fencing; 9 acres wetlands restored
Bentley Creek, Bradford County	35	4B	9,000 feet stream channel restored.
Spring Creek, Centre County	37	9C	1 acre riparian wetlands; 2 acres riparian forest and meadow
Cobbs Creek, Delaware and Philadelphia Counties	38	3G	1 acre wetlands created; 60 feet stream channel restored.
East Branch Codorus Creek, York County	39	7H	1,400 stream channel restored
Teedyuskung Creek, Pike County	40	1B	2,000 feet stream bank restored
Stony Creek, Montgomery County	41	3F	5 miles riparian habitat restored
Bradys Run Lake, Beaver County	42	20B	560 feet waterways built
Spring Creek, Centre County	43	9C	1,750 feet stream channel restoration
Manatawny Creek, Berks County	44	3D	4,000 feet riparian buffer restoration
Harveys Lake, Luzerne County	45	5B	300 feet lake shoreline, 750 feet streambank

IV. Pennsylvania's Nonpoint Source and Watershed Initiatives

Significant watershed improvement efforts are being made in Pennsylvania. These initiatives affect all surface waters as well as groundwater sources. Pennsylvania's State Water Plan (SWP) uses a major river basin delineation, which is further divided into sub-basins. One of the PA DEP Water Management Deputate's priorities is to revise the current water resource planning to meet current needs. Figures 1 and 2 are provided for reference so the reader can see where major river basins are located in Pennsylvania.

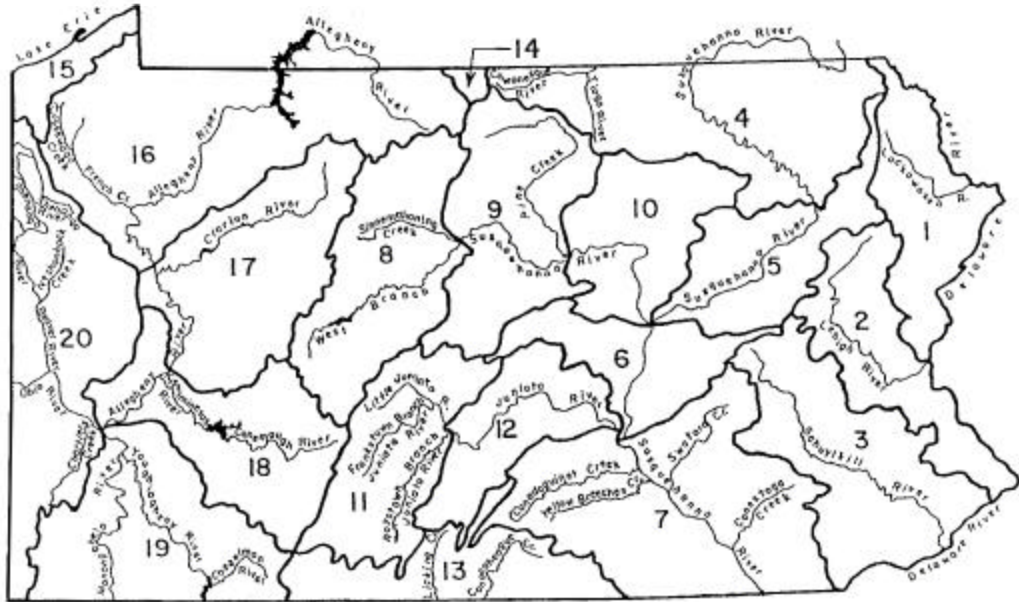


Figure 1 Pennsylvania State Water Plan basins

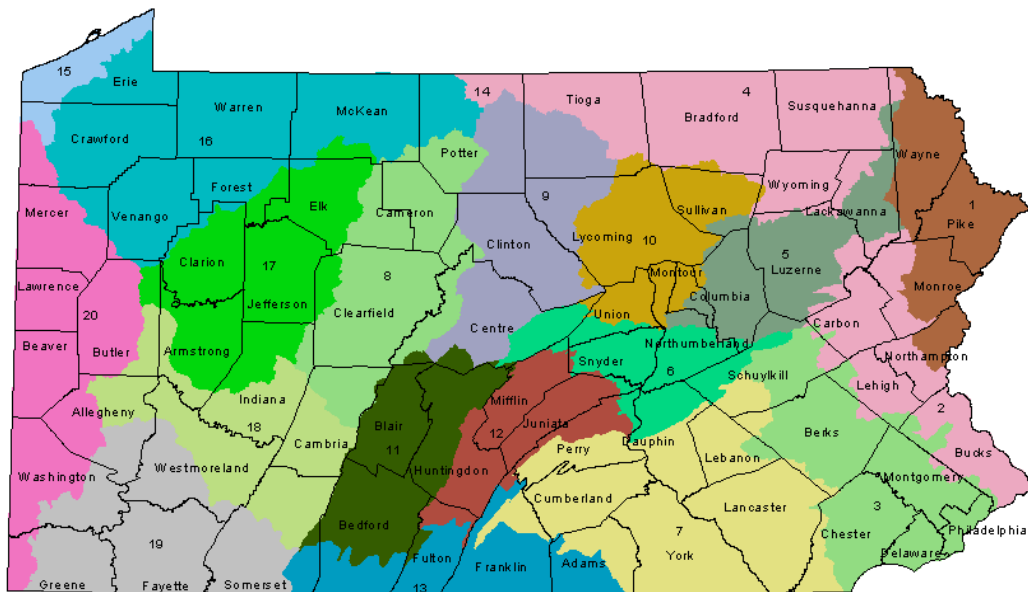


Figure 2 Pennsylvania State Water Plan basins and counties

Legislation Proposed to Protect PA Water Resources

PA DEP Secretary David E. Hess has recently outlined the Administration's new water resources initiative designed to inventory and protect PA's water resources from overuse.

"Water is one of our most precious resources," Hess said. "It is vital to our economy and to natural systems and habitats, yet we know little about how much water we have and how it is used. Proposed legislation will allow us to better manage our water resources by laying a foundation of solid information on which we can make decisions. In April and May 2001, citizens from all across Pennsylvania attended special Water Forums to express their most serious water resource concerns. They all had this in common: They aren't happy with the way water resources are managed and they want changes."

Secretary Hess discussed the water resources initiative at the first-ever Water Conservation Congress held in December 2001. The initiative is included in proposed legislation- Senate Bill 1230, sponsored by Senator James Gerlach (R-Chester) and House Bill 2230, sponsored by Rep. Art Hershey (R-Chester), that will accomplish four of the Schweiker Administration's water resources objectives that were recommended at the Water Forums. The four major objectives:

Update the State Water Plan

The DEP would complete an update of the State Water Plan in three years and have updates every five years thereafter. A new Statewide Water Resources Advisory Committee would be formed to help guide the planning process and assure broad public participation, including a formal review of the updated State Water Plan.

Identify Critical Water Planning Areas

It is expected that during the updating of the State Water Plan, areas will be identified where the demand for water exceeds, or is projected to exceed, available supplies. These areas would be designated as Critical Water Planning Areas and identified on a multi-municipal watershed basis, possibly covering a dozen or more local governments. Identifying Critical Water Planning Areas allows time and attention to be focused on those areas of the Commonwealth that have water problems without putting in place a large, complicated bureaucracy.

Create a Water Conservation Program

The Act would establish a formal program to promote water conservation and water use efficiency practices for all water users. A Water Resources Technical Assistance Center also would be created to promote the use and development of water conservation and water-use efficiency education and technical assistance programs. Grants would also be provided for water-resources education and technical assistance.

Set Water Well Construction Standards

The Act would modernize the Water Well Drillers License Act of 1956, transfer responsibilities from the Department of Conservation and Natural Resources (DCNR) to the DEP and require the DEP to develop water-well standards. The DEP, through the Environmental Quality Board, would establish minimum siting standards for, construction, alteration and abandonment of water wells with the help of a special 12-member Water Well Technical Advisory Committee.

“Protecting our water resources is an idea that is tied closely to our improved land-use planning laws,” Senator Gerlach said. “This legislation is intended to help communities work together on watershed planning issues, to protect our natural resources and guard against water shortages and water degradation. It recognizes that water, like land, is a finite and precious resource that must be managed to the best benefit of our people and our environment.”

Representative Hershey said, “The need for this legislation is abundantly clear. Drought conditions have existed over the last several years, and we are only going to increase our water uses in the future. We need to develop an up-to-date inventory of our water supply and uses. This legislation is vital toward that end.”

The PA Department of Environmental Protection’s website has new Water Resources Legislation information at www.dep.state.pa.us directLINK “water resources.”

Growing Greener Initiative receives National Recognition

The Council of State Governments recognized the Pennsylvania DEP for the Growing Greener Program as a 2001 Innovations Award winner for watershed protection and restoration. Innovations awards are presented annually to only the most innovative new programs in state government.

In the first three years of Pennsylvania’s Growing Greener program, more than 2,000 acres of abandoned mine land have been reclaimed. More than 4,200 acres of wetlands have been created or restored. More than 150 watershed assessment, restoration and protection plans have been completed and over 60 watershed groups have been organized. Pennsylvania’s \$650 million Growing Greener initiative is working thanks to the participation of many individuals and organizations. Growing Greener is the largest environmental investment in the Commonwealth’s history.

Growing Greener Initiative 2001

Since the beginning of Growing Greener in 1999 this initiative has produced significant educational and environmental achievement throughout Pennsylvania. Growing Greener has initiated hundreds of watershed and community projects. As these projects are being completed over the next several years may environmental results will be achieved. The Commonwealth’s Growing Greener partnerships will help to:

- Create or restore 4,261 acres of wetlands;
- Complete 188 miles of stream buffer restoration;
- Construct 171 miles of stream improvement structures;
- Reclaim 4,402 acres of abandoned mine lands;
- Restore 370.5 miles of streams from acid mine drainage; and
- Plug 1,242 abandoned oil and gas wells.

Along the way in achieving these environmental goals project sponsors will implement over four-hundred watershed implementation projects; initiate 184 environmental education projects; complete 156 watershed assessment, restoration and protection plans; and organize over sixty new watershed organizations.

Over the first three rounds of Growing Greener grant awards, project sponsors have been able to leverage substantial project match dollars for Growing Greener funds. Approximately \$127 million dollars in match funds have been generated to the \$86.6 million in state funding allocated over the first three project rounds. The first round of watershed protection and abandoned mine reclamation projects were announced on January 13, 2000 by Governor Mark S. Schweiker. In making these announcements Governor Schweiker remarked,

“Growing Greener has put the state’s largest-ever environmental investment where it can do the most good - in the hands of local communities and watershed groups. We will honor our proud industrial heritage by reclaiming abandoned mines. We will clean up streams. And we will enlist volunteers – from young children to our seniors – like never before in helping to make Pennsylvania greener.”

The partnerships, community involvement and environmental improvements being achieved through Growing Greener Initiative and the Commonwealth’s watershed improvement efforts are proving to be a very successful formula.

Watershed Restoration Action Strategies (WRAS)

The federal Clean Water Action Plan requires states to develop watershed restoration action strategies (WRAS) in cooperation with federal, state and local agencies, watershed-based organizations and the public for those watersheds most in need of restoration. WRAS are described as plans to restore watersheds that do not meet clean water, natural resource, and public health goals. Federal Clean Water Act Section 319 grant funds received from U.S. EPA are to be targeted to those watersheds most in need of restoration as identified in Pennsylvania’s Unified Watershed Assessment and for which WRAS were developed. WRAS have been developed for 32 state water plan sub-basins. Twenty-one WRAS were submitted to the EPA as final draft in 2001 and put on the DEP website.

WRAS are dynamic documents that will be updated regularly as more information becomes available and as remediation measures are implemented and water quality improvements documented.

- a summary of the geology, topography, land use, natural and recreational resources
- types and sources of water quality impairment
- monitoring and evaluation studies
- citizen and conservation groups
- specific areas or stream segments in need of restoration and potential restoration or best management practices (BMPs) necessary to achieve restoration
- summaries of all known remediation and preservation activities in the study area funded by state, federal and private sources.
- elements and recommendations of TMDLs, DCNR Rivers Conservation Grant Plans, and watershed assessments
- funding and restoration needs to support implementation and maintenance of restoration measures

- a table of the miles of impaired waters and the causes and sources of impairment from the PA 303d list and the DEP unassessed waters program and the stream miles meeting water quality criteria from the PA 305b list.

Total Maximum Daily Loads

DEP is beginning development of a watershed planning implementation process that, in addition to Section 319 funding where appropriate, will assist local communities in implementing nonpoint source TMDLs.

DEP has a total of 110 EPA approved TMDLs that are totally nonpoint source or have a nonpoint source component. Of these, 33 are AMD and 77 nonAMD.

Resource Extraction NPS Action Plan

Problem: Past resource extraction activities (abandoned coal mines) have degraded thousands of miles of streams in the Commonwealth. Comprehensive planning is necessary to determine the best course of action to remediate past degradation and to prevent degradation from future resource extraction activities.

a. **Milestone:** Twenty-five new watershed management plans written that incorporate prevention and remediation of pollution from resource extraction activities, and other NPS problems in the watershed over the next five years (five per year).

Lead Agencies: DEP-BWC, BAMR, BOGM, DCNR

Cooperating Agencies: BMR, CD's, PF&BC, PGC, NRCS, OSM, EPA, DOE, USGS, EPCAMR, WPCAMR, SRBC

Implementation Steps:

1. Promote active partnerships and establish roles of partners to plan and implement remediation activities.
2. Establish policies and incentives to encourage industry involvement and partnerships in planning and remediation activities.
3. Create initiatives that facilitate remining activities.
4. ❖ Encourage practices that ensure proper oil and gas waste disposal and plugging of abandoned wells.
5. Encourage more coordination and cooperation among DEP bureaus, other state agencies, federal agencies, county and local agencies, etc. for remediation activities.
6. ❖ Coordinate the new NPS plan with BAMR's Comprehensive Plan for Abandoned Mine Reclamation, BMR's Comprehensive Mine Reclamation Strategy.
7. Develop a standardized format for watershed restoration plans that include the six categories of NPS by 2001.
8. By 2003, create an accurate GIS map of all resource extraction impacted lands and waters.
 - Create maps based on known discharges on BAMR problem area maps identifying streams and unnamed tributaries impacted by AMD.
 - Characterize streams by categories based on impact; e.g. acidic, alkaline, iron precipitant, aluminum precipitant, etc.
 - Locate sources of impacts and types of pollution sources; (e.g. underground mine, surface mine, coal refuse piles, oil and gas); characterize streams by categories based on types of pollution sources.

- Encourage DEP to complete mapping of historical permit areas with mined-out areas identified, problem area maps, underground mine workings, completed reclamation sites with types of problems addressed, etc.
 - Provide GIS maps to watershed groups.
 - Identify all post SMCRA discharges with responsible parties for future planning purposes.
9. By 2002, create and maintain an accurate GIS map of all completed passive treatment projects with associated databases (attributes).
 10. Encourage reclamation incentives, including reclamation on public lands to increase recreation potential on reclaimed lands.
 11. Subdivide state water plan basins into smaller assessment units.
 12. Standardize water quality data collection for AMD project assessment.

Accomplishments

Watershed Restoration Action Strategies

Watershed Restoration Action Strategies (WRAS) are updated as current information becomes available, remediation measures are implemented, and water quality improvements are documented. WRAS were initially developed for high priority watersheds and are available on the DEP website.

The EPCAMR and WPCAMR are actively building coalitions in the Commonwealth and are engaged in many AMD watershed restoration activities. The DCNR Rivers Conservation Program develops restoration plans and NRCS PL-566 Watershed Improvement program helps implement AMD restoration projects.

New watershed management plans completed in 2001: Shamokin Creek, Northumberland County; Elk Run, Jefferson County; Little Schuylkill River, Schuylkill County. Started in 2110: Tioga River, Tioga County, West Branch Susquehanna River, Cambria, Clearfield, and Clinton Counties.

The EPCAMR, WPCAMR, Western Pennsylvania Conservancy, and many Conservation District Watershed Specialists and DEP Watershed Mangers are assisting watershed associations in AMD impacted watersheds to develop watershed restoration plans and to implement restoration projects.

The SRBC is working with partners in AMD impacted watersheds, and received Growing Greener Initiative funds to develop a watershed assessment and AMD remediation strategy for the Upper Tioga River watershed.

Reclaim PA addresses re-mining activities. Mine operators are providing assistance with construction for remediation projects funded with Growing Greener. Reclaim PA includes permitting improvements to encourage re-mining through standard plans and more flexibility in adding re-mining areas to existing permits.

The DEP-Bureau of Oil and Gas Management Final Technical Guidance document was completed in April 2000. Thousands of inspections that include consideration of proper well

plugging procedures, use of proper waste management and disposal practices, and the use of proper best management practices for erosion and sediment control are completed annually.

Coordination of reclamation activities among agencies is enhanced through Reclaim PA, the Abandoned Mine Drainage Technology Initiative (ADTI), the NPS Management Program's Resource Extraction work group meetings, and other initiatives. The EPCAMR, WPCAMR, Western Pennsylvania Conservancy, and many Conservation District Watershed Specialists and DEP Watershed Managers also help coordinate activities.

Mapping of abandoned mine lands and areas that have been restored continued in 2001.

The 3rd Annual AMD Conference was held in June 2001. Priority issues were developed and challenges for AMD restoration projects were a focus.

The WPCAMR is developing a web site a clearinghouse on AMD information, remediation, technology, and innovations. Five Operation Scarlift reports will be digitized to provide an example of historical information on mine drainage in specific watersheds.

Two Growing Greener Technical Assistance Grants were funded to help watershed associations develop design AMD implementation projects. These included one through Hedin Environmental for site evaluation and development of conceptual remediation plans and a second one through the Western PA Conservancy to help watershed associations develop remediation plans and determine remediation requirements for specific discharges.

b. Milestone: Continue monitoring passive treatment projects quarterly for two years after completion of construction; then once per year for life of project.

Lead Agencies: DEP-BWC, BAMR, BOGM

Cooperating Agencies: BMR, DMO, USGS, DOE, PF&BC, NRCS, RC&Ds, USACOE, watershed groups, educational institutions

Implementation Steps:

1. By 2004, establish plans for long term monitoring of completed remediation treatment facilities.
2. Continuing gathering information on types and locations of passive treatment facilities in place or in planning stages; if facility is functioning as expected, if any innovative design features were incorporated into the facility to increase efficiency of removal. Map facilities using GIS/GPS.

Accomplishments

A workgroup was formed to study and make recommendations on how to monitor and maintain passive treatment systems to be sure that they function properly. The group was comprised of DEP staff including watershed managers, Bureau of Watershed Management, Bureau of Abandoned Mine Reclamation, consultants and members of watershed associations.

An operations and maintenance manual is under development by the Somerset Co CD. This will help ensure that constructed AMD remediation projects will continue to function well. Also new technology will be advanced via information to improvements to older systems.

Many watershed associations or other project sponsors have made a commitment to maintain or monitor their AMD remediation projects on at least an annual basis. DEP Bureaus of Abandoned Mine Reclamation and District Mining Offices continue to monitor or check on projects in their areas.

The WPCAMR received a grant to develop a website that will be used for sharing of information on new technologies and improvement and maintenance of restoration facilities. Several sponsors have applied for and received additional funding for repair of treatment facilities to improve their efficiency.

Problem: The restoration of resource extraction impacted watersheds depends on the successful implementation of accepted innovative best management practices. Present remediation activities are not being addressed comprehensively.

c. **Milestone:** Begin implementation of watershed restoration plans based on local priorities and recommendations as funding becomes available.

Lead Agencies: WPCAMR, EPCAMR, BAMR, BMR

Cooperating Agencies: DCNR, BWC, BMR, BOGM, NRCS, USACOE, CDs, watershed groups

Implementation Steps:

1. Develop new organizations that focus on resource extraction remediation in highly impacted (high priority) watersheds.
2. By 2004, establish policies and incentives to encourage industry involvement and partnerships in remediation activities.
3. ❖ Continue to encourage policies that facilitate remining activities.
4. By 2004, establish standardized guidelines for implementation of remediation projects.

Accomplishments:

The organization of watershed associations continues with the help of the EPCAMR, WPCAMR, Western Pennsylvania Conservancy, and many Conservation District Watershed Specialists and DEP Watershed Mangers. These groups continue to develop watershed restoration plans with funding received through DEP Growing Greener and Source Water Protection, 319, DCNR Rivers Conservation Plans, and the NRCS PL-566 program. Reclaim PA and other DEP Mineral Resource Deputate programs promote these activities remining and restoration activities.

Problem: The development of new technology for the prevention and remediation of resource extraction pollution is needed.

d. **Milestone:** ❖ Revise this Milestone to read:

Develop new treatment technologies and/or a combination of technologies for nonpoint source pollution from resource extraction. (Develop one new treatment or prevention technology and/or combination of technologies for NPS from resource extraction per year.)

Lead Agency: DEP-BMR, BWC, BOGM, DOE

Cooperating Agencies: NRCS, USGS, BAMR, OSM, private consultants, educational institutions.

Implementation Steps:

1. ❖ Promote use of best technology for determination of likelihood of post-mining acid discharges on new permit applications for both surface and underground mining.
2. ❖ Encourage use of technological advances for prevention of post-mining breakouts of underground mines.
3. ❖ Assist oil and gas industry operators to develop economically and environmentally acceptable methods or technology for brine disposal.
4. ❖ Encourage policy changes to prevent future mine drainage formation by addressing mining technology and closure design associated with underground mining.
5. ❖ Continue to support or conduct demonstration projects that promote environmentally safe alternative oil and gas management practices.
6. ❖ Establish regular technology transfer meetings to discuss technology issues.
7. ❖ Encourage technological advancements in passive treatment technology.
8. ❖ Encourage the concept of resource recovery.
9. ❖ Identify nontraditional industry technologies that may be transferable to reclamation activities.
10. By 2004, develop Web page for disseminating new technological advances or solutions to solve current problems.

Accomplishments:

The DEP Bureau of Oil and Gas Management continues to experiment with new wetlands treatment technologies.

The annual AMD conference, national meetings, and Pennsylvania DEP meetings all promote technology transfer and information sharing. A website and email network for information

DEP BAMR has built and designed passive treatment systems that include “unproven” technologies including a variety of pyrolucite systems and variations on typical Anoxic Limestone Drains (ALDS), Oxic Limestone Drains (OLDS) and Vertical Flow Reactors (VFR’s).

Aluminum and iron precipitate recovery is being promoted through the work of private industry, consultants, conservation districts, local AMD restoration efforts, and the efforts of legislators.

The first product colored with recovered iron, a desk was made and given out as a demonstration at a DEP-POWR sponsored Partners in Progress conference in Slippery Rock PA.

e. **Milestone:** Revise to read, *Develop and adopt innovative policies and procedures to prevent degradation from future resource extraction activities.* (Number of innovative policies and procedures adopted to prevent degradation from future resource extraction activities.)

Lead Agencies: DEP-BMR, BOGM, OSM

Cooperating Agencies: DMOs, DOE

Implementation Steps:

1. ❖ Establish and encourage research programs to develop new technology or refine existing technology for remediation and prevention of pollution from resource extraction activities.
2. ❖ Encourage policy changes to prevent degradation from future resource extraction activities
3. ❖ Promote proper oil and gas brine management and plugging of abandoned wells.

Accomplishments

Surface mining pollution prevention activities:

- Overburden analyses have been extremely successful in predicting post-mining water quality.
- Overburden analyses to determine the potential for post-mining acid discharges are routinely done for the majority of surface mine permit applications.

Underground mining: Unlike for surface mining, reliable predictive methodologies for treating post-mining mine pool water are not available with the present mining technology. Mine layout has been proven to be the best way to prevent pollution.

The following strategies have been developed to prevent pollution from deep mines after mining is completed:

- promotion of post-mining inundation by down-dip development with proper location of mine openings and sizing and location of barriers
- restriction of mining to zones within the groundwater system where flow is relatively lethargic and time of travel is high compared to natural mine pool amelioration time frames
- mining in zones remote from groundwater discharge areas and features which may serve to short-circuit mine water to nearby existing water-supply aquifers or to the surface.

The best demonstrated technology is a combination of pre-mining hydrologic characterization and mine design. Components of proper mine design include avoiding features that can short-circuit flow, sizing adequate barriers, and properly locating mine openings. Post-mining AMD

avoidance techniques include inundation, mine sealing, grout curtains, inert gas injection, flowing artesian wells, regulated pumping and alkaline injection.

The US DOE has produced guidance on AMD prediction and remediation for deep mining. The guidance resulted from the Acid Mine Drainage Technology Initiative (ADTI) technical committees, a group of government and private sector scientists working on documenting emerging and existing technologies for AMD control.

Problem: There is a lack of consistency in administering Chapters 102 and 105 on non-coal mining sites.

f. **Milestone:** By 2004, incorporate conservation districts in the permit review process for non-coal mining sites.

Lead Agency: DEP

Cooperating Agencies: Conservation Districts

The workgroup suggests this milestone is no longer relevant to the major issues of NPS from resource extraction and should be deleted.

Problem: Funding of restoration activities is inadequate to make major improvements in watersheds affected by resource extraction activities.

g. **Milestone:** Secure one new funding source in the next five years.

Lead Agencies: EPCAMR, WPCAMR, watershed groups

Cooperating Agencies: Conservation Districts, DEP, NRCS, OSM, EPA, USACOE, DOE

Implementation Steps:

1. Encourage and locate sources of funding for long term monitoring of treatment facilities' effectiveness.
2. ❖ Secure continuing sources of funding for the development of new technologies in the treatment and prevention of resource extraction pollution.
3. Assist watershed associations in writing grants and finding sources of funding for remediation activities.
4. ❖ Encourage additional funding for DEP program to plug abandoned and orphan oil and gas wells.
5. Promote funding for addressing high volume abandoned underground mine, and oil and gas discharges.
6. Encourage Congress to reauthorize SCMRA (expires in 2004).
7. Establish long-term maintenance funds for AMD treatment projects.

8. Establish long-term funding mechanism to address discharges being treated "perpetually", planning for companies going bankrupt in the future.

Accomplishments

Several new funding sources have been secured. The Growing Greener Initiative is providing some funding for AMD remediation projects and technical assistance for project design.

h. Milestone: The percent increase in the amount of funding from AMR Fund used for Reclamation Projects in Pennsylvania from 1999 levels.

Lead Agencies: EPCAMR, WPCAMR, watershed groups

Cooperating Agencies: Conservation Districts, DEP, NRCS, OSM, EPA, USACOE, DOE

Implementation Steps:

1. Encourage Congress to allocate the remaining balance within the AMR Fund for the purposes it was collected.
2. Encourage Congress to spend what is collected annually in the Abandoned Mine Reclamation Fund as outlined in the Surface Mining Control and Reclamation Act.

Problem: The public, both within and outside the resource extraction regions, are generally unaware of both the extent of stream degradation from resource extraction and the treatment technologies available to remediate the pollution.

i. Milestone: Five public awareness activities on NPS resource extraction information annually.

Lead Agencies: DEP-BAMR, BWC, BOGM, WPCAMR, EPCAMR

Cooperating Agencies: BMR, USGS, NRCS, DMOs, CDs, OSM, EPA, DCNR, SRBC, watershed groups

Implementation Steps:

1. Provide information on the extent and effects of degradation from resource extraction and effects of remediation activities.
2. Actively involve the public in the education process through outreach to schools, watershed associations, senior citizens and others.
3. Provide information on treatment technology and roles of private and public groups in remediation efforts.
4. ❖ Promote technology transfer to public and private groups.
5. Provide an annual report to proper Pennsylvania legislative committees on the status of reclamation progress.

Accomplishments

Outreach

Numerous resource extraction public awareness activities were held in 2001. The DEP Reclaim PA program, Watershed Restoration Action Strategies, and Pennsylvania's AMD conferences all provide current information. The SRBC also provides outreach through a display and speakers bureau presentation. The EPCAMR and WPCAMR, DEP-BAMR and District Mining Offices actively promote AMD restoration efforts, provide sound technical assistance, and help watershed associations implement restoration projects.

The DEP-BOGM conducted two training sessions for industry and one training session for county conservation districts on BMPs for storm water control on access roads and well sites.

The annual AMD conference provides information to both public and private groups involved in mining reclamation. The annual AMD conference is an excellent source for technology transfer. The DEP BAMR and DMO help local watershed associations with developing and implementing AMD restoration projects. The DEP BAMR and DMO also hold regional conferences and workshops.

The DEP website at <http://www.dep.state.pa.us> through directLINK Reclaim PA provides current AMD remediation information.

Partners for managing NPS Challenges from Resource Extraction

ACOE	United States Army Corps of Engineers
CD's	County Conservation Districts
DCNR	Department of Conservation and Natural Resources, Bureau of Recreation and Conservation, Division of Conservation Partnerships
DEP	Department of Environmental Protection
BMR	DEP, Bureau of Mining and Reclamation
BAMR	DEP, Bureau of Abandoned Mine Reclamation
BWC	DEP, Bureau of Watershed Conservation
DMOs	DEP, District Mining Offices
BOGM	DEP, Bureau of Oil and Gas Management
DOE	United States Department of Energy, Federal Energy Technology Center
EPA	United States Environmental Protection Agency
EPCAMR	Eastern Pennsylvania Coalition for Abandoned Mine Reclamation
NRCS	United States Department of Agriculture, Natural Resources Conservation Service
OSM	United States Department of the Interior, Office of Surface Mining
PTU	Pennsylvania Trout Unlimited
PF&BC	Pennsylvania Fish and Boat Commission
PF&BC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
USGS	United States Geological Survey, Water Resources Division
WPCAMR	Western Pennsylvania Coalition for Abandoned Mine Reclamation

Agricultural NPS Action Plan

Problem: Many concentrated animal operations (CAOs) do not have nutrient management plans. Excessive nutrients from pastures, wastewater, manure applications, and nitrogen volatilization may pollute surface and ground waters.

a. ❖ **Milestone:** By 2004, 50% of all existing CAOs, based on local estimates will have nutrient management plans, and/or all CAOs will have nutrient management plans by 2015.

Lead Agencies: CD, PSCE, DEP, NRCS, PDA, SCC

Cooperating Organizations: Commodity groups, consultants, PACD, PAIA, PFB

Implementation Steps:

1. ❖ Adjust feed rations to reduce the amount and nutrient content of manure.
 - o Livestock and poultry feed should utilize components that reduce the amount of nutrients excreted.
2. ❖ Promote manure testing (*and research*) to redefine book values to include new manure handling systems, new feeding systems and alternative livestock and poultry enterprises.
3. Form focus groups to address strategic issues in nutrient management.
4. Encourage private sector and other non-government entities to write nutrient management plans.
 - o Promote training and certification
 - o Promote cost share for plan development
5. Revise and publish the PA Manure Management for Environmental Protection section of the *PA Manure Management Manual* by 2000.
6. Promote the cost-effectiveness and environmental benefits of nutrient management via news media especially magazines and newspapers such as *Lancaster Farming*.
7. Promote proper use of organic matter such as manure and compost to improve soil health and reduce runoff.
8. Distribute the Chesapeake Bay video on calibration of manure spreaders and promote its use.
9. Publicize and distribute fact sheets on calibrating manure spreaders by 2000.
10. Put farmers in communication with other farmers who have implemented good nutrient management plans (i.e. field days, rainy day or twilight meetings).
11. Require nutrient management plans on farms with a high potential for nutrient pollution (CAOs and CAFOs).
12. Develop and promote alternative uses of excess manure.

Accomplishments

Confined Animal Operations (CAOs)

Ninety-four percent of identified CAOs have submitted nutrient management plans. The number of CAOs identified in 1999 (refined estimate) was 976. This goal is nearing completion.

Summary	Totals
1999 estimate (revised)	976
Plans approved (CAO)	712
Total plans approved (CAO and voluntary)	1,199

Research and Education

Research into feed rations continues by PennAg Industries, University of PA, the Penn State University and Delaware Valley College of Science and Agriculture. The nutrient balancing study by the NRCS to analyze manure samples and provide reports to farmers for better feed was initiated several years ago and continues.

The Lancaster Farming and other agricultural newspapers promote nutrient management and prepare periodic supplements on special topics.

Cost-share for BMP implementation

Under Act 6 of 1993, approximately 250 private and public technical staff and farmers have been certified to write or review nutrient management plans to comply with the Act.

Under the Nutrient Management Law, Act 6 of 1993, the Plan Development Incentive Program (PDIP) has provided approximately \$254,000 in cost-share payments to farmers. The average cost-share per plan is \$420. Through 2001 approximately 600 applications received cost-share assistance.

The Nutrient Management Plan Implementation Grant program (NMPIG) has provided 148 grants statewide so far. About 46,000 acres are under plan. The total projected project costs exceed \$13 million with about \$7.3 million in grants approved through the program. Other sources have contributed approximately \$1.5 million.

AgriLink Loan Program

	FY99	FY00	FY01		
	Jan - June 00	July-Dec 00	Jan-June 01	July-Dec 01	Jan-June 02
No. of loans	6	4	0	11	7
Total \$\$	\$109,835	\$95,186	\$0	\$344,950	\$303,077

Most projects funded by the AgriLink Program have been waste management systems including barnyard and feedlot management. One rotational grazing project has been assisted. Luzerne, Northumberland, Bradford, Westmoreland, Somerset, Lancaster, Fayette, Wayne, Clearfield, Huntingdon, Susquehanna, Schuylkill, Centre, Clarion, Lebanon and Snyder Counties are areas where farmers have participated.

Technical Guidance

Revisions to the DEP's Manure Management for Environmental Protection Manual, Field Applications section, were completed in 2000. The other Sections of the Manual are revised as needed.

New and Innovative Technology

A Bio-Gas Digester was constructed on a farm in Schuylkill County in 2000 and is now operational.

Needs /Challenges

- Updating nutrient management regulations and Standard 590 to incorporate phosphorus index.
- Nutrient management plan implementation.
- Balancing excess manure import / export.
- Alternate technologies/options for manure management.

b. ❖ **Milestone:** Suggested rewrite:

Assess CAFOs in sensitive watersheds and those exceeding 1,000 AEUs by 2015. Require nutrient management plans to be regularly reviewed and implemented through 2015.

1. Assess facilities in HQ and EV watersheds first.
2. Require Nutrient Management Plan review and implementation for all CAFOs.

Accomplishments

The Commonwealth requires permits for all CAFO operations.

Type Permit	Issued	Reviewed
General permit (GP)	26	10
Individual permit	26	12
WQM Par. II	7	

c. ❖ **Milestone:** Install best management practices to reduce nutrient impacts on surface and ground water by 2015. Pollutant load reductions can be estimated from BMP implementation.

Lead Agencies: CDs, DEP, FSA, NRCS, PSU, SOC

Cooperating Agencies: SRBC

Implementation Steps:

1. ❖ Implement stream bank fencing, stream crossings and in-pasture watering systems on riparian areas in all priority watersheds by 2015.
2. ❖ Manage nutrients on pasture for optimum forage production and environmental protection.

3. Locate and manage "sacrifice areas" or high use corridors within pastures.
4. Promote grazing practices such as intensive and rotational grazing when environmentally and economically justified.
5. Promote environmentally sound agricultural land utilization of wastewater.
6. Promote constructed wetlands for environmentally sound treatment of wastewater.
7. ❖ Explore impact of composting of manure on volatilization.
8. ❖ Encourage incorporation of manure where economically and environmentally feasible.
9. ❖ Promote manure storage management practices such as covers, anaerobic digestion, and methane digesters.
10. ❖ Research manure storage structure design alternatives.
11. Promote use of cost-sharing practices through the CBP, NMA, EQIP, S. 319, and DEP Wetland Replacement Program and Stream bank Fencing Program that minimize and control manure runoff from barnyards (i.e., curbs, roofing, filter areas, constructed wetlands, hard surfaces and other BMPs.) Divert clean water away from barnyard, lanes and walkways.
12. Promote education programs for industry and farmers related to management of runoff from barnyards and walkways.
13. Adopt statewide standards for planning, design and construction of manure management systems in the *PA Manure Management Manual* by 2000.

Accomplishments

Implementation

PA DEP administers the Section 319 NPS and Chesapeake Bay programs. The USDA, NRCS provides funding and technical assistance for PL-566 project implementation and the Environmental Quality Incentives Program (EQIP). The PDA administers the Plan Development and Incentive Program (PDIP), Nutrient Management Plan Implementation Grant, and Agri-Link. Ducks Unlimited and the Chesapeake Bay Foundation implement major watershed restoration initiatives with state and federal funding. (See appendices)

Chesapeake Bay Program

The Chesapeake Bay Program was initiated in 1983 in Pennsylvania. Nutrient management was introduced as a cost-shared practice in July 1985. Stream bank fencing was initiated in cooperation with the PA Game Commission in 1987, and in 1994 the DEP Streambank fencing program began. Nutrient management standards were adopted in April 1990. Two basic program components are the technical assistance funding program (TAFP) and the financial assistance funding program (FAFP). The TAFP includes forty-one conservation district technicians, seven conservation district engineers, and three engineering assistants. The FAFP provides cost-share to conservation districts.

Nutrient Management

Two grazing coordinators are employed by the NRCS and provide technical assistance to farmers. Grazing Conferences sponsored by Resource Conservation and Development Councils

(RC&D) are held each Spring. Act 6 of 1993 provides training for private and public nutrient management technicians.

Wetlands are used to treat wastewater where climate conditions are good for wetland plant growth.

Innovative Technology

A cooperative project between the PA DEP, Wenger Feeds, and the US Department of Energy completed a Bio-Gas Digester project in Schuylkill County in 2000.

Monitoring

Monitoring data for the Susquehanna River basin is available through the Susquehanna River Basin Commission (SRBC). The Delaware River Basin Commission and the USGS National Agricultural Water Quality Assessment (NAWQA) program monitor watersheds throughout the Commonwealth. USGS water quality information is available at <http://pa.water.usgs.gov/>.

Needs and Challenges

- Water quality data documenting reductions in sediment, nutrients, and other water quality impairments achieved as a result of agricultural BMP implementation.

Problem: Non protective agricultural practices and inadequate riparian buffers/stream corridor stabilization, increase erosion and soil loss, degrade surface water quality and diminish aquatic habitat and food sources for aquatic life.

d. ❖ **Milestone:** It is estimated that 50-60% of Pennsylvania farms have written conservation plans and are implementing them. Increase this number by 4% annually through 2004.

Lead Agencies: CDs, DEP, FSA, NRCS, PSU

Cooperating Agencies: SRBC

Implementation Steps:

1. Continue agency technical assistance for conservation planning and implementation.
2. Continue cost-sharing programs for implementing conservation plans.
3. ❖ Promote best management practices (BMPs) to minimize soil erosion:
 - a. vegetative practices (cover crop)
 - b. management practices (crop rotations, residue management, conservation buffers)
 - c. run-off controls (diversions, terraces, waterways)
4. Put farmers in touch with other farmers who have implemented good conservation plans (field days, rainy day or twilight meetings).
5. Promote training and certification programs for conservation planning to interested individuals.

6. Promote cost sharing for the development of conservation plans approved by the conservation district.

Accomplishments

Certification Program

The PA NRCS implemented a conservation planning certification program beginning in 1999-2000. The NRCS holds *Certified Conservation Planner training* for NRCS, conservation district, and other resource agency staff. The Comprehensive Nutrient Management Planning and Standard and Specification 590 revisions are included. Approximately fifty NRCS staff received training in the initial sessions.

Needs / Challenges

- Conservation Plans implementation.
- New conservation planners continuing education and training.
- The addition of phosphorus to nutrient management planning requirements will be a significant challenge for the agricultural community.

e. ❖ **Milestone:** Suggested rewrite,

Establish twenty-five (25) miles of riparian buffers annually to minimize nutrient and sediment impacts on streams, and install ten (10) or more miles of stream bank fencing in pasture land annually through 2004. (Formerly milestones E and G).

Lead Agencies: CDs, DEP, NRCS, PennDOT, PF&BC, PGC

Cooperating Agencies: Watershed Organizations

Implementation Steps:

1. Continue to promote agricultural stream crossings via General Permit, technical assistance, and cost sharing procedures.
2. Provide technical and financial assistance for in-field livestock water systems.
3. Study alternative riparian buffer designs for their potential to return economic gains to farmers.
4. Conduct educational effort to promote forest and grass riparian buffers.
5. Investigate or research phosphorus uptake by vegetation in riparian buffer areas.
6. Compile and disseminate information on funding sources for riparian buffers.

Accomplishments

Riparian Buffers

PA Stream ReLeaf, Section 319, NRCS programs, Ducks Unlimited and the Chesapeake Bay Foundation provide assistance. The Chesapeake Bay Foundation and Ducks Unlimited Initiatives provide incentive payments for buffer establishment. The Conservation Reserve Enhancement Program (CREP) was initiated in 1999 and is successfully implementing buffers in the lower Susquehanna River basin. DEP fact sheets are being developed and revised. The PA Stream ReLeaf method for reporting buffer accomplishments is being revised.

Research

The Pennsylvania State University is conducting research on plant nutrient uptakes as they relate to riparian buffer establishment.

The Stroud Water Research Center is conducting an EPA National Monitoring Program project to look at the long-term effects of riparian buffer uptake of nutrients in a primarily agricultural watershed in southeastern PA. This is one of three National Monitoring Program projects in Pennsylvania, and one of twenty-two (22) in the country. This project is in its fifth year of a five-year initial phase.

f. ❖ **Milestone:** Achieve a ten percent increase in Conservation Reserve Enhancement Program (CREP) enrollment each year through 2010.

Lead Agencies: DCNR BOF, DEP, DU, FSA, PDA, PGC, Pheasants Forever, NRCS, SCC

Cooperating Agencies: watershed groups

Implementation Steps:

1. Establish CREP by 2000 and successfully implement.
2. Develop and provide public outreach for farmers and landowners on CREP.

Accomplishments

CREP sign-ups and implementation continues in the 20-county Lower Susquehanna River basin area. The USDA-FSA keeps statistics on acres signed up, accepted into the program, and practices completed and being implemented.

The PA FSA office website <http://www.pa.fsa.usda.gov> provide additional CREP information. The nine CREP specialists employed through the NRCS and PA Game Commission (PGC) continue to do field work. They assist with field checks and sign-ups, which will continue through at least 2001.

A PA CREP Communications Plan is being developed through the State Conservation Commission (SCC) with input from the national and state USDA, FSA offices, PA NRCS, and the PGC. CREP outreach efforts are being made on the county level by providing pamphlets to farm operators and landowners through the local FSA offices. Partners are preparing public information displays for the 2002 Pennsylvania Farm Shows.

Active CREP Contracts (1998-2002) ⁹		
Contracts	Acres Contracted	Estimated Cost-share
1,209	25,597	\$6.1 million

⁹ As of October 15, 2001

Needs / Challenges

- Continue support for the nine NRCS-PGC field biologists funded under CREP.
- Expand CREP program beyond the 20-counties in the Lower Susquehanna River basin.

g. ❖ **Milestone:** Suggested rewrite,

Establish twenty-five (25) miles of riparian buffers annually to minimize nutrient and sediment impacts on streams, and install ten (10) or more miles of stream bank fencing in pasture land annually through 2004. These two milestones are similar in their goals to preserve and enhance riparian habitats. (combined milestones e. and g.)

Lead Agencies: CDs, DEP, NRCS, PGC, FSA

Cooperating Agencies: watershed groups

Implementation Steps:

1. Continue to cost share installation of stream-bank fencing.
2. Continue to promote agricultural stream crossings via General Permit and cost sharing.
3. Provide technical and financial assistance for in-field livestock water systems.
4. Promote stream-bank fencing with riparian buffers in pasture land.

Accomplishments

The PA DEP Stream bank fencing program, Ducks Unlimited, Chesapeake Bay Foundation, CREP programs, Section 319 NPS program, USDA Environmental Quality Incentive Program and Pennsylvania's Growing Greener Initiative have provided resources to implement many projects. County conservation district and NRCS field office staff are providing technical assistance.

DEP Stream Bank Fencing program

	1994 - 6/30/01	7/01/00 – 6/30/01
Stream protected (miles)	85	14
Riparian habitat protected (acres)	868	164

PA Conservation Partnership¹⁰

	Eastern PA	Western PA	Total
Stream protected (feet)	69,383	137,756	207,139
Riparian / wetland habitat protected (acres)	126	169	295

Problem: Agricultural related pathogens, wastewater contaminants, and pesticides can lead to surface and groundwater contamination.

h. ❖ **Milestone:** Suggested rewrite,

¹⁰ 2001 DU/CBF

Promote a statewide system of conservation districts with trained staff to implement programs at the local level to minimize NPS water quality impacts. A significant part of this effort will be to increase the number of agricultural conservation technicians by 25% by 2004 to assist the agricultural community with BMP implementation to reduce NPS impacts. (combined milestones h. and j.)

Lead Agencies: CDs, PSCE, DEP, PACD, PDA

Cooperating Agencies: watershed groups

Implementation Steps:

1. Determine the non-nutrient chemicals of concern.
2. Identify and promote nutrient management practices that reduce pathogens and non-nutrient chemical contamination of surface and groundwater.
3. Promote all pesticide use in the context of an Integrated Pest Management System.
4. Promote 'Chemsweep' and other programs to reduce unused herbicides and insecticides.
5. Promote use of containment facilities and in-line sprayer cleaning systems through educational programs and cost sharing.
6. Continue programs to recycle clean, empty plastic pesticide containers.

Accomplishments

Technical Assistance

Conservation districts employ fifty-three watershed specialists with funding assistance from the Growing Greener Initiative.

The Technical Assistance Grant program has hired an engineer and engineering technician in each of four NRCS Technical Centers in PA. Planning, design, and construction assistance is provided for Growing Greener, Section 319, and other projects.

Agricultural conservation technicians

Program employing conservation planning technicians	# employed
PDA Agriculture Conservation Technician Program (ACT)	42
DEP Chesapeake Bay Program	48
Conservation Reserve Enhancement Program (CREP)	9
Total	99

Pesticide Recycling

The PDA, DEP, and local municipalities sponsor the Plastic Pesticide Container Recycling Program. Approximately 50 tons of pesticides and 35 tons of pesticide containers were recycled in 2001.

i. ❖ **Milestone:** Suggested rewrite,

Increase education, outreach and technology transfer opportunities including conducting ten activities to promote composting and/or other innovative environmentally safe disposal methods for dead livestock and poultry each year through 2004. (combined milestones i. and l.)

Lead Agencies: PDA

Cooperating Agencies: CDs, DEP, NRCS, FSA

Implementation Steps:

1. Update requirements and standards for composting dead livestock and poultry.
2. Provide technical and financial assistance for composting dead livestock and poultry.

Accomplishments

Composting

The NRCS in PA approved the Practice 317 for Composting in 1999. Agricultural waste composting practices can now receive financial assistance, and are becoming more widely utilized in the agricultural industry.

Technology Exchange

A Nutrient and Sediment Technology Forum is being planned. It is scheduled for February 2002. The DEP has launched a new Technology Center Initiative, information on which is available on the DEP website <http://www.dep.state.pa.us> . The Penn State University is providing research under the direction of the Nutrient Management Advisory Board (Act 6). The project entitled, *Economic Impacts using P-based nutrient management-Impacts on 12 Farms* is some of the most recent research done in PA.

Problem: The delivery of NPS programs and assistance to landowners and operators is not consistent statewide.

j. ❖ **Milestone:** Suggested rewrite,

Promote a statewide system of conservation districts with trained staff to implement programs at the local level to minimize NPS water quality impacts. A significant part of this effort will be to increase the number of agricultural conservation technicians by 25% by 2004 to assist the agricultural community with BMP implementation to reduce NPS impacts. (combined milestones h. and j.)

Lead Agencies: CDs, DEP, SCC, NRCS, PDA

Cooperating Agencies: All, PSACC

Implementation Steps:

1. Develop and maintain a strong working partnership with conservation districts, improve working relations, and develop new opportunities to improve the partnership.
2. Build the capacity of conservation districts, define and develop core capabilities, support locally driven capacity development, and provide technical training and support services.
3. Develop adequate funding for conservation district programs, promote existing programs and successes, develop new program opportunities, and develop new revenue sources.
4. Utilize group conferencing capability to address technical questions and share information.
5. Continue the activities of the Agricultural NPS Liaison network to help implement the NPS Program at the local watershed level through the conservation districts.
6. Encourage federal, state, and local agencies/organizations to coordinate and communicate their programs to help implement Pennsylvania's Nonpoint Source Program at the local watershed level through the conservation districts.
7. Encourage funding for BMPs in special protection watersheds to maintain water quality.

Accomplishments

CD Funding

County conservation districts employed 481 staff as of November 2001. In the state's FY2001/2002 budget \$3.1 million was in the DEP allocation and \$1.21 million in the PDA allocation for a total of \$4.31 million earmarked for conservation district programs. The PA Association of Conservation Districts and the DEP regularly provide training and development programs for county conservation district staff.

Problem: Funding for both BMP implementation and technical assistance is inadequate to address all non-point source problems and prevent NPS pollution.

k. ❖ **Milestone:** Develop and implement new funding sources for addressing agricultural NPS through 2004.

Lead Agencies: DEP, PDA, SCC, USDA FSA, NRCS

Cooperating Agencies: US EPA

Implementation Steps:

1. Achieve Enhanced Benefits State status to increase Section 319 funding allocations from Clean Water Act.
2. Develop and implement a delivery system for the Growing Greener Initiative.
3. Secure state and federal budget allocations for technical assistance and planning assistance for agricultural BMP implementation, bio-solids education and other agricultural programs.
4. Promote local and private efforts to secure additional funds.
5. Implement AGRI-LINK to provide funding for a broad base of agricultural BMPs to address NPS challenges.

6. Support legislation and new initiatives, such as Conservation Reserve Enhancement Program (CREP), to promote low interest loans, grants, and increased incentive payments for specific agricultural BMPs.

Accomplishments

Technical Assistance

Technical Assistance Grants (TAG) for engineer and engineer technician positions were funded through the Growing Greener Initiative. Eight TAG positions were created in the four regional NRCS Technical Assistance Centers.

Best Management Practices

The Growing Greener Initiative supports agricultural implementation projects. The Nutrient Management Act's Plan Development and Incentive Program (PDIP), Agri-Link, Nutrient Management Plan Implementation Grant programs provide BMP implementation monies. The PDA administers these three programs.

Needs / Challenges

- Contractors cannot always meet construction demands.
- Better coordinate multiple program resources to address documented water quality impairments.

Problem: Communicating new technologies to the general public and the agricultural community are a challenge.

1. ❖ Milestone: Suggested rewrite,

Increase education, outreach and technology transfer opportunities annually through 2004 including conducting 10 activities to promote composting and/or other innovative environmentally safe disposal methods for dead livestock and poultry. (combined milestones i. and l.)

Lead Agencies: PSCE, CDs, PACD

Cooperating Agencies: DEP, PDA, USDA, RI, PASA

1. Develop manure and compost exchange and transportation directories for regions of the state with high animal numbers by 2004.
2. Define incentives that are needed to encourage manure and compost exchange and transportation.
3. Publicize and promote the manure and compost exchange and transportation directories through the Internet and other sources.
4. Research feed additives effect on nitrogen volatilization.
5. Promote innovative best management practices to prevent and/or minimize non-point source pollution from agricultural activities.

Accomplishments

Feed Additives

The Penn State University, University of Pennsylvania, Delaware Valley College of Science and Agriculture, in cooperation with Penn-Ag Industries are doing research on feed additives and nutrient management. The University of Pennsylvania's School of Veterinary Medicine at New Bolton Center conducting nutrient uptake and feed additive research.

Outreach

The SCC, PDA, DEP, and Penn State University partnership sponsors training for Nutrient Management Planners who are Act 6 certified. Workshops cover a broad range of topics. Conservation districts with delegated authority under Act 6 are required to provide informational and education programs each year, and informal educational efforts through newsletters, presentations, and news media.

The DEP provides direct links to agricultural topics including *CAFO*, *Farm-A-Syst*, *Composting*, *Stream Bank Fencing program*, *Stream ReLeaf*, *Water Management*, and *Nutrient Management Programs* on the Farmers homepage on www.dep.state.pa.us.

Needs / Challenges

- Continue to promote and implement new technologies and practices for the agricultural community.

Agricultural Nonpoint Source Management Partners

ACB	Alliance for the Chesapeake Bay
CBF	Chesapeake Bay Foundation
CDs	Conservation Districts
PSCE	Penn State Cooperative Extension
CMA	Crop Management Associations
EPA	U.S. Environmental Protection Agency
FSA	Farm Services Agency
NRCS	Natural Resources Conservation Service
PADH	Department of Health
PACD	Pennsylvania Association of Conservation Districts
PADEP	Pennsylvania Department of Environmental Protection
PAIA	Penn Ag Industries Association
PASA	Pennsylvania Association for Sustainable Agriculture
PDA	Pennsylvania Department of Agriculture
PENNVEST	Pennsylvania Infrastructure Investment Authority
PFB	Pennsylvania Farm Bureau
PF&BC	Pennsylvania Fish and Boat Commission
PFU	Pennsylvania Farmers' Union
PGC	Pennsylvania Game Commission
PSACC	Pennsylvania State Association of County Commissioners
PSG	Pennsylvania State Grange
PSU	Pennsylvania State University - College of Agricultural Sciences
RI	Rodale Institute
SCC	State Conservation Commission

SRBC
U of P
USDA

Susquehanna River Basin Commission
University of Pennsylvania
United State Department of Agriculture

Construction, Dirt and Gravel Road and Urban Runoff NPS Action Plan

This is a comprehensive list developed by the Construction and Urban Runoff work group. Not all of these tasks can be achieved within the next five years.

The pollution prevention initiatives are indicated by this symbol ❖ . Pollution prevention is important to nonpoint source management because it involves preventing pollution from occurring at its source, before it is generated and has to be disposed of, or cleaned up.

Problem: Accelerated erosion and sedimentation impacts to our waterways are a leading cause of water quality impairment and reduce the productivity and utilization of our soil resource.

a. ❖ **Milestone:** Annual Report on Chapter 102/105 program activities which indicates that effective best management practices to minimize accelerated erosion and prevent sediment pollution are being implemented for earthmoving activities. The report summarizes agency and conservation district accomplishments including plan review, technical assistance, permitting, compliance and enforcement activities, program hours/costs and inspections.

Lead Agencies: CDs, DEP

Cooperating Agencies: NRCS, PennDOT, PF&BC, PACD

Implementation Steps:

1. ❖ Seek and obtain new and increased levels of funding assistance for conservation districts' continued administration of the E&SPC Program.
2. ❖ Complete by 2000, complete revisions to the Department's Chapter 102 Erosion Control Regulations.
3. ❖ Update and revise existing program guidance documents and reference manuals to reflect regulatory changes.
4. ❖ Publicize, distribute and provide training for *The Best Management Practices Handbook for Developing Areas* publication which integrates runoff planning and design for construction and permanent storm water management.
5. ❖ Continue and enhance yearly technical training sessions and conduct 20 program evaluations to ensure consistent, technically sound program administration by county conservation districts and DEP regional offices.
6. Encourage flexibility and new technology and require the use of performance based criteria for BMPs.

Accomplishments:

Chapter 102 Program Summary

Sixty-five (65) conservation districts were delegated Ch.102 E&SPC responsibilities at three levels during 2000. Four districts were delegated at Level 1 authority, 51 counties at Level II, and 10 at Level III. Sixty (60) Level II and III districts are also delegated responsibilities for processing National Pollution Discharge Elimination System (NPDES) Stormwater Permits associated with construction activities. During 2000, districts reviewed approximately 11,000 E&SPC plans, comprising over 161,000 project acres with almost 54,000 of those acres being disturbed. In addition to plan reviews, districts processed and authorized over

1,600 general NPDES permits and 173 individual NPDES permits for stormwater discharges associated with construction activities. Over \$1.5 million in fees was collected for E&SPC reviews, and \$303,000 collected for NPDES Stormwater Construction Permit application fees; over \$1.8 million was generated to assist conservation districts in implementing these programs.

Districts also conducted nearly 9,000 compliance inspections on 5,350 permitted and non-permitted sites and investigated almost 2,000 citizen complaints concerning possible Chapter 102 violations. As a result of compliance inspections and complaint investigations, the majority of projects attained compliance voluntarily. One-hundred sixteen (116) cases of noncompliance were referred to the DEP for resolution. In addition to DEP efforts, Level III districts initiated 34 civil and summary actions that resulted in site conditions being corrected.

Chapter 102 and 105 Program Evaluations

The DEP Waterways, Wetlands, and Erosion Control program evaluated 18 conservation district programs pursuant to their delegated responsibilities in the E&SPC, NPDES, and Water Obstruction and Encroachment Programs. This process continues to provide an opportunity to the DEP and Conservation Districts to interact and communicate program recommendations. Both the district and DEP personnel have indicated that the evaluation process has brought about improved communication and understanding of program requirements.

A summary of evaluations indicate:

- Conservation districts continue to provide consistent application of the delegated requirements for Water Obstructions and Encroachments, E&SPC, and NPDES Stormwater Construction Permit programs.
- There is a positive working relationship between the DEP and conservation district staff.
- Conservation district staff have developed a positive working relationship with local governments, citizens, and landowners.
- New conservation district staff employees have required more training to be provided by the DEP.

Chapter 102 and 105 Programs' Training and Outreach

The Waterways, Wetlands, and Erosion Control staff conducted 17 training and outreach sessions in 2000. Approximately 582 persons attended these programs. County conservation district staff conducted 227 sessions, with more than 9,400 participants attending the training. In addition, districts provided technical assistance to approximately 25,000 (Ch 102 and NPDES programs) and 6,400 (Chapter 105 program) members of the regulated community. Topics covered include Ch 105 and 102 regulations, basic wetland identification, NPDES permitting, wetland mitigation banking, wetland restoration, and erosion and sediment control. The audiences generally consisted of cooperating local, state, and federal agencies, land developers, contractors, engineers, planners, consultants, municipal officials and the general public.

Needs / Challenges:

- Continue to provide training on use of the BMP Handbook for Developing Areas.
- Require use of performance based criteria for BMPs.

Problem: Local land use decisions often impact NPS pollution to water resources, resulting in an immediate threat to special protection waters.

b. **Milestone:** Track and summarize the percent increase in the total reimbursement dollars for regional planning at county and municipal levels to implement nonstructural, proactive NPS pollution control strategies from 1999 levels.

Implementation Steps:

1. Develop and implement a delivery system for Growing Greener Initiative.
2. Promote adoption and implementation by municipalities of model ordinances that promote water quality protection.
3. Develop more flexible design criteria and standards that promote water quality protection.
4. Encourage planning and implementation of zoning strategies that are compatible with environmentally sensitive areas.
5. Develop workshops and curricula addressing the interrelationship between land use decision-making and NPS pollution prevention.

Accomplishments:

Funding and Legislation

PENNVEST funding levels have increased significantly. FY98/99 funding was \$6.7 million, FY 99/00 funding increased the amount by \$0.8 million, and an additional \$8.1 million was allocated in the FY00/01 cycle.

Act 167 funds have increased from \$595,000 in FY98/99 to \$1.2 million in FY 99/00.

Act 67 and 68 were passed by the PA State legislature in 2000.

The Growing Greener Initiative provides grant funds to PENNVEST for infrastructure improvements to Storm Water facilities.

The Water Resources Education Network (WREN) provided funding to communities and local organizations to educate the community on drinking water and watershed protection, and coordinated a meeting for these community groups' project leaders. Over twenty new WREN funded were initiated over the past year. The League of Women Voters of PA (LWVPA) website <http://pa.lwv.org/pa/> provides details.

Regulations

The PA DEP has developed a model storm water ordinance with water quality provisions. Counties are required to include water quality, ground water recharge, and channel protection in Storm water Planning.

The revised Chapter 102 regulations require performance-based BMPs.

Act 167 Storm water management plans are being developed to include measures to protect water quality.

Outreach

The DEP has co-sponsored Watershed Academies and Growing Smarter Land Use forums have been held around the state in 2000-2001.

Problem: Pending new federal regulations to permit stormwater discharges will affect the regulated community, imposing potentially duplicative state and federal requirements.

c. **Milestone:** Phase II NPDES Stormwater Permit Requirements are integrated into ongoing state programs.

Implementation Steps:

1. Revise manuals and information.
2. Train CDs on new procedure.
3. Train cooperating agencies, engineers, and municipalities, on new procedures.

Accomplishments:

New Permit Requirements

Chapter 102 and 105 Manual revisions are under development.

A Phase II NPDES work group was organized and provided recommendations. The final target date for completion is October 2002.

The PA DEP and county conservation districts provide workshops to educate municipalities on the NPDES Phase II requirements and implementation schedules. Phase II requirements are being integrated into existing E&SPC and storm water programs. Conservation district sponsored NPDES and E&SPC programs provided training for approximately 9,500 participants in 227 workshops.

An implementation strategy has been developed.

Problem: There are 28,000 miles of unpaved roads in the Commonwealth. Dust and sediment from these roads cause environmental impacts.

d. ❖ **Milestone:** Number of identified problem sites corrected with BMPs funded from the Dirt and Gravel Road Program and project funding by county and year.

Implementation Steps:

1. ❖ Continue demonstration projects to show erosion control benefits, new drainage methods, and demonstrate new technologies for controlling erosion and sedimentation.
2. ❖ Continue education and training initiatives for local officials and road maintenance personnel.
3. ❖ Prepare technical guidance materials for local Quality Assurance Boards and conservation district staff, to ensure efficient administration of the grant program and adherence to environmentally sensitive standards.

Accomplishments:

As of April 2001 more than 30% of the original 900 identified worksites sites had pollution remedied through completed projects. Of the 10,000+ additional program-eligible pollution sites identified with GIS, more than 2% have been corrected within a year.

GIS training has been provided to 66 conservation districts.

Technical guidance for the program has been produced. Information on the program is available through the PDA website by selecting State Conservation Commission (SCC). The SCC develops, adopts and implements all policies and procedures for the Commonwealth's Dirt and Gravel Road Program as established under S.9106 of the PA Vehicle Code.

The Section 319, Growing Greener Initiative, and Dirt and Gravel Road Programs have funded several demonstration projects showing how to correct problems on unpaved roads. Projects were done in Juniata County and Tioga County under 319; Growing Greener is funding a project in the northeastern part of the state.

Problem: A clearinghouse is needed to share information on innovative approaches and new cost-effective technologies to minimize environmental impacts from dirt and gravel roads.

e. ❖ **Milestone:** By 2003 create a Center for Dirt and Gravel Road Maintenance to serve as a permanent clearinghouse and resource to identify, coordinate and fund appropriate research.

Implementation Steps:

1. Develop outreach programs to publicize new approaches and technologies.

Accomplishments:

The Center for Dirt and Gravel Road Studies was created at the Penn State University, website <http://www.mri.psu.edu/centers/cdgrs/>.

The Dirt and Gravel Road Pollution Prevention Program has formed a Program Advisory Committee. The Program Advisory Committee has established four work groups to help improve the program. The work groups are Basic Science; Policy and Planning; Education and Outreach; and Product, Practice & Process Review.

The Dirt and Gravel Roads program has been *established in 65 counties* the have municipalities owning dirt and gravel roads eligible for assistance through this program. Delaware and Philadelphia counties do not have roads eligible for the program.

Problem: Since passage of the Storm Water Management Act, the Commonwealth has conducted stormwater planning for only 16 percent of its designated watersheds.

f. ❖ **Milestone:** By 2004, develop and approve an additional 25 Act 167 stormwater management plans.

Implementation Steps:

1. ❖ Approve five storm water management plans and adopt 50 municipal ordinances annually through the Act 167 watershed planning process.
2. ❖ Encourage all other municipalities, not part of a watershed plan, to adopt a storm water management ordinance. Promote adoption of model ordinances that include planning and water quality requirements.

3. ❖ Educate land developers, municipal authorities and the general public on stormwater management techniques, watershed wide implementation of stormwater management and the relationship between land use changes and stormwater runoff. In particular, educate these individuals about providing stormwater management controls throughout parcels being developed that would not adversely impact groundwater recharge and would maintain good water quality.
4. By 2004, use PENNVEST low interest loans to construct, improve, rehabilitate or retrofit an additional 16 public stormwater facilities.

Accomplishments:

Seventy-six (76) plans have been completed since program's inception. Sixteen new plans have been completed and one plan updated since October 1999. These seventeen (17) plans are in parts of ten (10) counties and include one-hundred twenty-four (124) municipalities.

Completed Stormwater Management Plans

Watershed	Approved	County	Municipality
Delaware River (north)	October 1999	Bucks	8
Tohickon Creek	October 1999	Bucks	16
Little Wapwallopen/ Wapwallopen Creek	December 1999	Luzerne	12
Beaverdam Br Juniata River	May 2000	Blair	10
Bowmans Creek	August 2000	Wyoming	6
Grafius, McClures and Millers Run	September 2000	Lycoming	4
Mill Creek	October 2000	Luzerne	8
Big Run	February 2001	Jefferson	5
Canoe Creek			3
E Br Mahoning Creek			2
Elk Run			5
Stump Creek			3
Canoe Creek	February 2001	Indiana	3
E Br Mahoning Creek	February 2001	Clearfield	4
Stump Creek	February 2001		3
Little Lehigh (update no 1)	September 2000	Lehigh	10
Tulpehocken Creek	August 2001	Berks	22
Totals: 17		10	124

Adoption of storm water management ordinances by municipalities are being encouraged through training, workshops, and other outreach efforts.

Recent Stormwater Management Plans are available on PA DEP website www.dep.state.pa.us .

PENNVEST low-interest loan funding increased from \$0.8 million in FY99 to \$6.7 million in FY2000. The Growing Greener Initiative provides grant funds to PENNVEST for infrastructure improvements to storm water facilities.

Problem: Past and present stormwater planning efforts have concentrated primarily on addressing stormwater quantity impacts. Urban runoff and resulting water quality impairment continue to be significant problems that require additional attention.

g. ❖ **Milestone:** Beginning in 2000, Stormwater Management Plans incorporate water quality design and pollutant reduction criteria.

Implementation Steps:

- ❖ Promote use of Section 319 funded Best Management Practices Handbook for Developing Areas through training programs, workshops and news releases.
- ❖ Incorporate structural and nonstructural water quality BMP components into local municipal ordinances developed through the Act 167 watershed planning process.

3. Recommend that municipalities, prior to granting final approval, require the review and approval of the stormwater components of development drainage plans by individuals trained and certified in the design and implementation of BMPs. In addition, early coordination meetings between developers and individuals trained and certified to review plans, should be encouraged as a means of minimizing the number of changes that would be necessary to site development plans.
4. ❖ Create additional funding sources to accelerate the pace of watershed planning for both stormwater quantity and quality.
5. For each municipality participating in Stormwater Planning distribute a copy of BMP Handbook and provide a workshop for all participants involved in SWP process.

Accomplishments:

The PA DEP asked counties to include a water quality component to the stormwater plans in 1998. This was made mandatory in 1999. Until May 2001, the implementation of water quality components by municipalities was voluntary. Since then, it has become mandatory. Many existing plans have voluntarily added a water quality/BMP component.

<i>Stormwater Plans with Water Quality/ BMP Component</i>		
<i>Watershed</i>	<i>Year</i>	<i>Status</i>
<i>Lake Wallenpaupack</i>	<i>1989</i>	<i>Voluntary</i>
<i>Brodhead Creek</i>	<i>1991</i>	
<i>Stony Creek/Saw Mill Run</i>	<i>1991</i>	<i>Voluntary</i>
<i>Neshaminy Creek</i>	<i>1992</i>	
<i>Mahoning Sechler Run</i>	<i>1995</i>	<i>Voluntary</i>
<i>Paxton Creek</i>	<i>1996</i>	<i>Voluntary</i>
<i>Little Neshaminy Creek</i>	<i>1996</i>	
<i>Lake Erie/Elk Creek</i>	<i>1996</i>	<i>Voluntary</i>
<i>Saony Creek</i>	<i>1997</i>	<i>Voluntary</i>
<i>Tobyhanna Creek</i>	<i>1997</i>	<i>Voluntary</i>
<i>Bow, Beaver, Manada, Kellock Creeks</i>	<i>1998</i>	
<i>Little Constoga River</i>	<i>1998</i>	<i>Voluntary</i>
<i>Mill Creek-Lancaster Co</i>	<i>1998</i>	<i>Voluntary</i>
<i>Lower Merion drainage area (Montgomery Co)</i>	<i>1998</i>	<i>Voluntary</i>

<i>Wapwallopen Creek</i>	<i>1999</i>	<i>Voluntary</i>
<i>Bowman's Creek</i>	<i>2000</i>	<i>Voluntary</i>
<i>Mill Creek-Luzerne Co</i>	<i>2000</i>	<i>Voluntary</i>
<i>Big Run, Canoe Cr, Stump Cr, E Br Mahoning Creek</i>	<i>2001</i>	<i>Voluntary</i>
<i>Graphius, McClures, Miller Run</i>	<i>2001</i>	<i>Mandatory</i>
<i>Tulpehocken Creek</i>	<i>2001</i>	<i>Mandatory</i>

PA Stormwater Planning Grant funding increased from \$595,000 in FY98/99 to \$1.2 million in FY99/00.

The Growing Greener Initiative and Section 319 funding provide incentive for storm water management study and research, and demonstrating innovative stormwater management BMPs.

Needs / Challenges:

- Update the BMP Handbook for Developing Areas to meet broadened goals and objectives, and to meet the implementation challenges.
- Inventory types and sources of assistance that are available, e.g. conservancies and other local non-profit organizations, and promote and foster the delivery of help by these sources.

Problem: Stormwater management systems and programs at the municipal level are under-funded and need more financial and technical assistance.

h. Milestone: Total dollars for reimbursement requests from municipalities for implementation of adequate stormwater management systems and programs to protect health and safety and reduce water quality impacts from storm sewer discharges. By 2004, total reimbursement will increase by 50% over 1999 reimbursement rates.

Implementation Steps:

1. Integrate proposed Phase II NPDES Stormwater Regulations for municipalities into existing state watershed planning and permitting programs. Develop process to fund and encourage municipal implementation with Act 167 program resources.
2. Continue promotion of PENNVEST funding for municipal stormwater projects. Modify application process and revise program support to help municipality's meet future NPDES stormwater permit requirements.

Needs / Challenges:

- Provide funding for more innovative technical practices, and to monitor BMP effectiveness.

Proposed new Milestone: Track implementation of local stormwater ordinance, and track increase in local ordinances that address NPS pollution. Implementation Steps: Education;

funding BMPs and enhancements; innovative urban BMPs; and evaluating how to do effective monitoring and maintenance. A big challenge is education and funding problems. Both Growing Greener and Section 319 can fund BMPs and enhancements. The EPA's National Monitoring Program (NMP) can provide longer-term monitoring; PA needs to look at other possible NMP projects in watershed affected by urban runoff.

List of Partnerships

for Managing NPS Challenges from Construction, Dirt and Gravel Road and Urban Runoff

CD	Conservation District
DEP	Department of Environmental Protection
DRBC	Delaware River Basin Commission
ICPRB	Interstate Commission on the Potomac River Basin
Municipalities	Local Municipalities
NRCS	Natural Resources Conservation Service
ORSANCO	Ohio River Valley Sanitation Commission
PACD	Pennsylvania Association of Conservation District
PennDOT	Pennsylvania Department of Transportation
PENNVEST	Pennsylvania Infrastructure Investment Authority
PF & BC	Pennsylvania Fish and Boat Commission
PSU	Penn State University
PTU	Pennsylvania Trout Unlimited
SCC	State Conservation Commission
SRBC	Susquehanna River Basin Commission
SWCS	Soil and Water Conservation Society
USACOE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VU	Villanova University

In addition to the above partners, local watershed groups, local and county associations of homebuilders, planning departments and economic development organizations within the watershed need to be involved.

Land Disposal NPS Action Plan

Problem: About four million people in Pennsylvania rely on groundwater for drinking water. About 1.3 million households in Pennsylvania use on-lot systems for sewage disposal. The potential for both surface and groundwater quality pollution exists.

a. **Milestone:** 1,200 Sewage Enforcement Officers (SEOs) and 1,000 local government officials attending on-lot sewage related training annually.

Lead Agency: DEP

Cooperating Agencies: Municipalities, ACB, PSCE, PSU, DVC, PSATS

Implementation Steps:

1. Coordinate and distribute technical updates among the DEP regional staff involved with on-lot wastewater management.
2. Promote consistency among DEP's regional offices involved with on-lot wastewater management through electronic group conferencing.
3. Facilitate the development of county/regional level onlot sewage management.
4. Provide updates to the Sewage Enforcement Officers (SEO) Guidance Manual.
5. Continue formalized training for SEOs and emphasize both public health and environmental impacts of on-lot wastewater systems.
6. Provide required oversight and support of SEOs.

Accomplishments:

Outreach

DEP staff regularly use email and conference calling to discuss on-lot sewage issues and policies. Statewide staff meetings are conducted twice a year. Use of DEP staff electronic distribution lists to pass information on issues that occur between routinely scheduled inter-regional staff meetings has promoted greater consistency among DEP Regional Offices.

Individual Sewage Facilities Planning Specialists at DEP Region and District offices provide support and oversight for local municipality SEOs.

Reimbursement Program

An enhanced (85%) reimbursement program has been implemented that is targeted to encourage the formation of joint local agencies for the purpose on implementing regional level on-lot sewage management programs. DEP participated in a professionally facilitated, on-lot disposal maintenance roundtable discussion hosted by PSATS and attended by 20 to 25 municipalities from across the state. The roundtable discussion was the first step in developing a municipal work group to identify actions the PA DEP and municipalities could take to promote on-lot sewage management.

SEO Manual

The SEO manual is out of print and will not be reprinted. Instead, DEP is developing an SEO field manual that includes all information needed by an SEO in the field for permitting and inspections. The manual is currently under development with a goal to be provided to certified SEOs in Spring 2001.

Training

DEP conducted five SEO pre-certification academies for a total of 119 SEO candidates and 45 continuing education courses for 932 certified SEOs.

The DEP Sewage Facilities Program is coordinating efforts with the Penn State University and Delaware Valley College on methods to enhance the Act 537 program training and outreach. Consistent technical information, potential educational opportunities for the DEP regulated community and public, and improved coordination between the two organizations are goals. Participants agreed to continue to develop a closer DEP/PSCE relationship with a goal of employing PSCE field staff resources to improve education about on-lot sewage disposal to the public.

Research

The USGS is studying the effects of land application of treated sewage effluent at the New Garden Township Spray Irrigation site in Chester County. The study is focused on studying the effects of wastewater irrigation on the water and nitrogen budgets of a 60-acre study area.

Needs and Challenges:

- The PA Rural Water Association (PRWA) is considering developing a training program for local government officials.

Problem: If on-lot systems are not installed and maintained properly, surface and groundwater become polluted.

b. **Milestone:** By 2004, increase by 50 the number of local governments that adopt sewage management programs. Number of onlot remediation projects funded through PENNVEST.

Lead Agency: DEP

Cooperating Agencies: Municipalities, ACB, PSCE, PSU, DVC, PSATS

Implementation Steps:

1. By 1999, complete the Manual for Municipalities (319 Project) on onlot sewage treatment systems. Continue to provide training on onlot systems (including approved alternative systems) management to municipal officials.
2. ❖ Encourage municipalities to adopt an ordinance for onlot wastewater system management.
3. By 2001, develop fact sheet on denitrification technology available for on-lot wastewater. Encourage use of new denitrification technologies for on-lot systems where appropriate.

4. Encourage further research in denitrification technology and other alternate onlot technologies.
5. ❖ By 2001, develop a distribution system for the informational folder for rural homeowners on water conservation and how septic systems and approved alternative systems work, including the economic and environmental consequences of neglecting to maintain them.
6. Encourage greater use of demonstrated alternative technologies for individual homeowners and for community systems through additional technical training for SEOs.
7. By 2001, develop a builder's informational package for care and maintenance of on-lot systems to be distributed by septic tank suppliers and installers.
8. Continue and expand the use of State Revolving Fund monies for repair or replacement of faulty onlot wastewater systems. Increase publicity and provide application assistance.
9. By 2001, develop informational folder on onlot technologies evaluated at the Delaware Valley College of Science and Agriculture (DVC).
10. By 2001, develop installers' training program for new on-lot technologies.
11. By 2001, develop a training program on maintenance for septage haulers.

Accomplishments:

All municipalities are required to evaluate an on-lot disposal system maintenance alternative when preparing an update revision to their Act 537 Official Plan. If considered an appropriate selection based upon the sewage disposal needs analysis contained elsewhere in the plan, they are expected to adopt such an ordinance.

A Third-Party Verification Protocol was prepared by The Environmental Technology Evaluation Center (EvTEC) for the evaluation of Nutrient Reduction (specifically nitrogen reduction) technologies for individual homes and small communities.

A second contract was implemented with DVC to continue the research on alternate on-lot technologies. Several of the options to be evaluated include testing various filter medias, improving the performance of the re-circulating sand filter and modifying the constructed wetlands.

The informational folder for homeowners discussing on-lot disposal systems, on-lot disposal system maintenance and water conservation is currently being revised. Upon completion, it will be provided to regional offices for distribution to the public and posted to the DEP internet website.

A research / demonstration project was completed by DVC for on-lot sewage treatment and disposal methods. A report entitled, *New Wastewater Technologies for Pennsylvania / On-lot Systems and Small Flows / Research and Development – Working with Nature*, was completed in 2000. This research has been widely distributed.

As part of the New Garden Township Spray Irrigation project the USGS is studying the effects of denitrification on the nitrogen cycle. The subsurface loss of nitrate through denitrification is being documented using lysimeters and shallow groundwater wells.

Needs and Challenges:

- The PRWA program is considering adding sewage management as a program area.

Problem: Improper handling and disposal of biosolids can generate nonpoint pollution.

c. **Milestone:** By 2001, certify 400 people for land applying biosolids.

Lead Agency: DEP

Cooperating Agencies: ACB, CDs, PSCE, PDA, WEA, WWTP

Implementation Steps:

1. ❖ Continue formal training for sewage plant operators on generating biosolids that can be beneficially used.
2. Continue formal training for landowners and haulers of bio-solids on the proper land application of bio-solids. Training should include emphasis on implementing a nutrient management plan on farms where conservation practices have already been implemented.
3. Research and demonstrate the use of bio-solids in: (a) mining, re-mining and reclamation, and (b) timber harvesting and forest plantings.
4. Encourage involvement of county conservation districts and cooperative extension (PSCE) in bio-solids education.
5. Research environment impacts of land applied bio-solids in: (a) Do a sewage sludge survey and a statistical analysis of sludge parameters on samples analyzed over the past 20 years and publish findings, (b) Research potential bio-solids impact on soil, crop, and water quality parameters and publish findings, and (c) Research environmental effects of phosphorus accumulation resulting from land applied bio-solids and publish findings.
6. By 2000, develop a series of four fact sheets bio-solids land application in Pennsylvania.

Accomplishments:

Biosolids Program

During FY2000-2001 there were 48 county conservation districts participating in the program, of which 20 participated at Level 1 involving education and referring complaints to the appropriate regional office. The education portion includes setting up 2 displays and completing an approved work plan consisting of at least 7 elements. Twenty-eight districts participated at Level 2 involving education, complaint investigations, and site inspections. Districts completed 474 inspections, 48 informational work plans, and set up and maintained 86 displays at a cost of \$443,350. It is anticipated that in FY2001-2002 a total of 49 county conservation districts will participate in the program with 20 at Level 1 and 29 at Level 2. The anticipated costs are \$600,000.

Training

DEP trained 65 bio-solids generators and land applicers during the year 2000. The training course reviews state bio-solids regulations, sampling procedures, land application site assessment and management practices, calculation of agronomic loading rates, record keeping and reporting, and permit requirements.

Program Outreach

Forty-eight (48) county conservation districts are delegated the bio-solids program.

Two DEP produced bio-solids fact sheets have been completed. A third fact sheet for landowners adjacent to proposed bio-solids land application sites is currently under development.

Research

Research projects are being conducted to evaluate odor problems, pathogen transport, and nutrient availability. The Penn State University evaluated land application of bio-solids to determine changes in quality from 1978 to 1997 and compared data to current regulatory standards. Results were published in a PSU fact sheet, the Journal of Environmental Quality, and Biocycle magazine. The Penn State University is continuing bio-solids studies on phosphorus accumulation and availability.

Problem: The general public needs to understand how to properly dispose of waste and the consequences of improper waste disposal. What we do affects our neighbors and what our neighbor does affects us. The cumulative effect of improper waste disposal can be significant.

d. **Milestone:** By 2004, complete 350 Chem Sweeps on individual farms. Complete three household hazardous chemical collection days per year. By 2004, have 950 participating collection stations for used oil. By 2015, install pump-out stations and hull maintenance areas at state park marinas with the 6217 management areas. By 2002, develop public service announcement for TV and radio on proper disposal of waste.

Lead Agencies: DEP, Solid Waste Management Authorities, PDA, Watershed Organization

Cooperating Agencies: ACB, DCNR-B of SP, PFBC, PSCE

Implementation Steps:

1. ❖ Develop fact sheets, video or 30-second public service announcements to communicate the risk and the cost benefit analysis of waste disposal in order to motivate people to change their behavior. Prepare posters, signs, brochures and fact sheets to point out improper waste management behavior and to recommend proper management techniques. Focus should include the following topics:
 - ❖ Improper disposal of used oil/used oil filters, antifreeze, solvents, or other household chemical wastes by dumping them on the ground, pouring them into a storm sewer drain, or disposing of them in a sink connected to an onlot septic system or municipal sewer system.
 - ❖ Toxicity and sources of run-off, drainage, and leachate and the potential for contaminating water systems/aquifers.
 - ❖ Types and sources of pathogens from point source (PS) and nonpoint source (NPS).

- ❖ Environmental impacts of boat cleaners, solvents, waste oils, paints from in-water hull cleaning, changing of engine oil and fueling.
 - ❖ Alternatives to home pesticide/herbicide use—such as disease resistant/native species plantings.
2. Increase level of grant money for household hazardous waste collection to municipalities.
 3. Promote PA's Used Oil/Used Oil Filter Recycling Partnership established for the purpose of recycling used oil and used oil filters.
 4. Promote Chemsweep – the PDA waste pesticide collection program to properly dispose of household pesticide products.
 5. ❖ Hold workshops for automotive service managers, operators and owners to explain economic, as well as, environmental benefits to recycling used oil and used oil filters. Include information on how fleets can lengthen the use of motor oil via sampling.
 6. Secure sufficient pump-out stations at state park marinas.

Accomplishments

ChemSweep

The DEP works with the PDA to make household hazardous waste collections available to interested sponsors along with Chemsweep collections. Two counties, Beaver and Centre, will take advantage of Chemsweep collections to also offer household hazardous waste (HHW) collections. More counties are expected to piggyback on the Chemsweep program to offer HHW collections to residents.

Farm-A-Syst

The most recent Farm-A-Syst worksheet #7, *Petroleum Product Storage and Handling*, was completed in 2000.

Outreach

The Commonwealth's household hazardous waste (HHW) program has expanded. Any sponsor who registers a HHW program with DEP is eligible to apply for reimbursement of part of the costs. Under Act 190 of 1996, the Small Business and Household Pollution Prevention Program Act, the DEP reimburses up to 50 percent of eligible HHW program costs, not to exceed \$100,000 per county per fiscal year. The DEP gives funding priority to existing programs and those operated by counties, multi-county groups, and first- and second-class cities, as required by Act 101.

The PA DEP and Sheetz Convenience Store partnership is developing educational materials for recreational vehicle users. The PA DCNR Bureau of State Parks will use this poster at their facilities.

Oil Collection Stations

Approximately 820 used oil collection stations are in place. An effort is being made to generate more interest in rural areas. The PRWA is interested in helping generate interest for wellhead protection areas. The PRWA is also collecting information from inspection station owners.

Pump-out stations

The PFBC has stations at their Walnut Creek Access Area and the Northeast Marina on Lake Erie. The DCNR has established stations at Neshaminy Creek State Park in Bucks County and Presque Isle State Park in Erie County.

Needs / Challenges

- Outreach to DEP Regions on the importance of used oil recycling and waste oil regulation modifications. Assist Regions to help and encourage more effectiveness in promoting these programs with the public.

Problem: Pollution is expensive. From an economic and environmental perspective, pollution prevention makes the most economic sense.

e. ❖ **Milestone:** By 2001, conduct six Home A-Syst outreach activities statewide. Distribute Farm-A-Syst outreach information to all 67 counties by 2000.

Lead Agencies: DEP, OPPCA

Cooperating Agencies: ACB, PSCE

Implementation Steps:

1. ❖ Identify and incorporate pollution prevention source reduction opportunities in all programs as a way to reduce nonpoint impacts. Some examples are:
 - a. water conservation education
 - b. Farm-A-Syst Program
 - c. Home-A-Syst Program
 - d. proper maintenance of septic systems/publicize available loans for repair of faulty systems
 - e. role of pollution prevention in generation of "clean" bio-solids
 - f. underground storage tank management/publicize available loans for repair of faulty systems.
 - g. best management practices/maintenance program for stormwater control
 - h. proper lawn and garden care to prevent nutrient runoff and incorporate integrated pest management
2. ❖ Distribute fact sheets and post information on DEP website on household alternatives to hazardous wastes; product substitution such as nontoxic materials, organic/nonpolluting/biodegradable/ "safer" materials. Web site will also provide procedures to minimize hazardous waste stream.

3. ❖ Develop fact sheet and/or PSA, based on Home-A-Syst, on water related pollution prevention in and around the home.
4. ❖ Distribute pollution prevention materials to municipalities through the PSATS annual county conventions.

Accomplishments

Home-A-Syst

This is now accessible via the DEP website. It was a valuable tool for the PA 2001 Envirothon competition especially the current topic *Urban/Storm water NPS Pollution*.

The PA Farm-A-Syst program is a comprehensive farm evaluation program and includes seven worksheets on topics: Water Well Condition and Construction, Pesticide and Fertilizer Storage and Handling, Household Wastewater Treatment System, Barnyard Conditions and Management, Milkhouse Waste Management, Stream and Drainageway Management, and Petroleum Storage and Handling. A pre- and post- evaluation survey is included. The Farm-A-Syst program information is located on the DEP website www.dep.state.pa.us by choosing homepage 'Farmers.'

Underground Storage Tank Program

The PRWA is assisting the DEP in promoting conversion of underground storage tanks (USTs) to above ground tanks (ASTs).

Needs and Challenges

- Promote Home-A-Syst, Farm-A-Syst and other pollution prevention measures so homeowners and the general public can use them.
- Replace Underground Storage Tanks with Above ground tanks to try and minimize problems with leaking into groundwater. No funding is currently available to do this.

Partners for Managing NPS Challenges from Land Disposal

ACB	Alliance for the Chesapeake Bay
DCNR-BSP	PA Department of Conservation and Natural Resources, Bureau of State Parks
DEP	PA Department of Environmental Protection
DVC	Delaware Valley College of Science and Agriculture
PSCE	Penn State Cooperative Extension
NRCS	Natural Resources Conservation Service (USDA)
PSAB	Pennsylvania Sewage Advisory Board
PSATS	Pennsylvania State Association of Township Supervisors
PSU	Pennsylvania State University
SEO	Sewage Enforcement Officer
USEPA	U.S. Environmental Protection Agency
WEA	Water Environment Association
WWTP	Wastewater Treatment Plant

Municipalities and their Sewage Enforcement Officers (SEOs) and

homeowners are key to managing onlot wastewater systems to minimize NPS pollution.

Silvicultural NPS Action Plan

Problem: Pennsylvania has 520,000 forest landowners and 4,000 forest practitioners who affect the management of 13 million acres of private woodland. The potential for polluted runoff during harvesting exists.

a. ❖ **Milestone:** Provide 10 workshops per year to communicate consistent information to loggers, landowners, and government officials on best management practices for silvicultural activities.

Lead Agencies: CD, DCNR-BOF, PGC

Cooperating Agencies: DEP, PCPF, PFA, PSCE, RC&D, SFI of PA

Implementation Steps:

1. ❖ Continue training efforts with Sustainable Forestry Initiative of PA forest practitioners.
2. ❖ Develop a website for Sustainable Forestry Initiative of PA issues by 2000.
3. ❖ Develop a training schedule for forest practitioners on water quality.
4. ❖ Insure "Master Logger" certification program is consistent with this nonpoint source pollution goal.
5. ❖ Develop a "statement of mutual intent" supporting BMP manual developed at PSU to maintain consistency among practitioners.
6. ❖ DCNR Bureau of Forestry will improve outreach with organized groups of forest landowners.

Accomplishments

In 2001, 81 core courses and 45 CE courses were offered. A total of 193 core courses were Approximately 1,400 people took one or more courses and 193 persons completed the core course schedule.

The website is up and running at www.sfi of pa.org. Several links have been created with partner companies.

Training schedule: 17 Timber Harvesting, 24 Conservation practices for Logging, and 6 Advanced Logging Practices training sessions.

Master Logger certification guidelines have been completed.

The forestry partner network is revising the BMP manual.

Two new landowner groups were established in 2001. The DCNR-Bureau of Forestry and the Penn State University Cooperative Extension and School of Forestry are promoting the formation of landowner groups.

Problem: Effective communication with 520,000 woodland owners and 4,000 forest practitioners is difficult. Proper BMP implementation is hard to visualize for many people.

b. ❖ **Milestone:** Each year develop one new forest demonstration site in a Service Forest Project Area that incorporate Nonpoint Source Best Management Practices (BMPs) for silviculture.

Lead Agencies: CDs, DCNR – BOF

Cooperating Agencies: BSP, PSCE, PFA, PCPF, USDA-NRCS, USDA-FSA, RC&Ds

Implementation Steps:

1. ❖ Develop BMP demonstration sites in each county statewide using public lands where appropriate.
2. ❖ Develop self-guided tour brochure for each site.
3. ❖ Distribute tour brochures to county conservation districts, extension offices, district forest offices, state parks, and local tourist information offices.
4. Develop video to show proper implementation of best management practices.

Accomplishments

Two new demonstration forests are being planned, one in Potter County and one in Warren County. A northern tier auto tour brochure is being developed to promote good forest management.

A Section 319 grant in FY98 helped the Headwaters RC&D Council design and implement a series of Forestry BMP Demonstration sites in highly visited forest tracts. Training events for timber harvesting professionals were held at each site. Ten BMP site plans were initiated as of December 1999 and some had been completed. They are located on private, industrial, university, and state lands in Venango, McKean, Jefferson, Beaver, Huntingdon, Fulton, Lycoming, Northumberland, and Dauphin counties. Approximately 19 sites were initially selected. This BMP demonstration project was started in 1998-99 and is continuing.

A portable bridge video has been developed and is in its final approval stage.

Problem: The amount of timber harvest activity proposed on the 13 million acres of forest land in Pennsylvania makes it difficult to enforce regulations.

c. ❖ **Milestone:** By 2000, develop a self-evaluation form for forest practitioner/landowner to evaluate BMP installation.

Lead Agencies: SFI of PA, PDSAF, PCPF

Cooperating Agencies: CDs, DCNR – BOF, PSCE

Implementation Steps:

1. ❖ Create and distribute self-evaluation form for forest practitioner and landowner to use to evaluate effectiveness of BMP installation.
2. ❖ Organize an evaluation team to train forest practitioners on proper use of self-evaluation form by 2000.
3. Provide a process that a forest practitioner can use to voluntarily request assistance without penalty to correct BMP installation problem.

Accomplishments

Timber Harvesting Assessment Forms are being received and data input to the SFI database. Approximately 226 forms have been received.

Problem: The effectiveness of BMP training needs to be evaluated. Currently no baseline data exists.

d. ❖ **Milestone:** By 2004, develop a system to establish BMP baseline implementation. By 2010, develop a system to track BMP implementation.

Lead Agency: SFI of PA

Cooperating Partners: CDs, DCNR – BOF, HDC, NRCS, PSCE

Implementation Steps:

1. ❖ Develop baseline information on statewide BMP implementation in 1999 based on existing public sources.
2. ❖ Check BMP implementation in five years and adjust training accordingly.

Add new step, 3. Increase the number of SFI partner companies.

Accomplishments:

Information on practice implementation, forest certification, timber harvesting assessments and other baseline data is being collected.

Operation and maintenance for best management implementation continues.

Problem: Many of the 520,000 forest landowners do not realize they are ultimately responsible for the control of polluted runoff from their property. Nor are they aware of the number of landowner assistance programs in the state.

e. ❖ **Milestone:** Distribute 500 SFI landowner packets per year to inform landowners of their responsibility for minimizing nonpoint source pollution. Provide 10 landowner workshops on silvicultural BMPs per year. Enroll 150 new landowners in Forestry Stewardship Program (FSP) in 2000.

Lead Agency: DCNR - BOF

Cooperating Agencies: CDs, PSCE, SFI of PA, PFB

Implementation Steps:

1. ❖ Distribute Sustainable Forestry Initiative of PA Landowner Packets to landowners prior to timber harvesting operations.
2. ❖ Encourage landowners to enroll in Clean and Green Program as incentive to maintain long-term forest management goals.
3. ❖ Encourage landowners to enroll in Forest Stewardship Program (FSP).
4. ❖ Continue landowner workshops on silvicultural BMPs.

5. ❖ Periodic notices in cooperating agency newsletters informing the public of their responsibility if they harvest trees on their land

Accomplishments

During the first ten months in 2001, 2,107 SFI packets were distributed.

Landowner enrollment in the FSP continues; The FSP completed 106 new plans covering approximately 20,500 acres during 2001. This program is under-funded and thus cannot enroll the desired number of new landowners. There was a seven-month delay in providing funding to states in FY2001.

Approximately one-hundred twenty-nine programs have been offered to landowners.

Problem: Landowners are not aware of the value of riparian forest buffers in protecting water quality and providing aquatic habitat and food sources for aquatic life.

f. ❖ **Milestone:** Increase by 5 per year the number of articles/publications in immediate circulation to encourage landowners to establish and maintain riparian forest buffers. Number of workshops held on riparian forest buffers. Amount of cost-share dollars provided by SIP.

Lead Agencies: DCNR and DEP

Cooperating Agencies: ACB, CDs, PA Stream ReLeaf, PSCE, USDA-FS, USEPA

Implementation Steps:

1. ❖ Publicize existing data that identifies the need for riparian forest buffers.
2. ❖ Develop workshops for landowners, local government officials and consultants on the benefits of riparian forest buffers.
3. ❖ Provide free planting stock to cooperating landowners to establish riparian forest buffers.
4. ❖ Provide funding for Stewardship Incentive Program (SIP) to provide cost sharing for establishing riparian forest buffers by 2000.
5. ❖ Establish an initiative to restore 600 miles of new riparian forest buffers in Chesapeake Bay Watershed by 2010, and to restore and conserve riparian forest buffers wherever feasible along all waterbodies statewide.
6. By 2004, develop a video that identifies areas that need riparian forest buffers, programs available to assist, and agencies to contact.

Accomplishments

The Stroud Water Research Center National Monitoring Program project is completing the fifth year of a five-year project to monitor how effectively riparian buffers remove sediment and nutrients from overland runoff and groundwater. This project is located in the Brandywine-Christina River basin in southeastern Pennsylvania.

A water quality monitoring proposal is being developed to initiate water quality and wildlife habitat monitoring within the 20-county Conservation Reserve Enhancement Program (CREP) area in south central PA. This is a proposed voluntary program for CREP participants.

The DEP and DCNR in cooperation with the Stroud Water Research Center, PA Organization for Watersheds and Rivers (POWR), and other local organizations develop and conduct workshops.

Providing free shrub and tree planting stock to local conservation organizations is ongoing.

EPA provided approximately \$50,000 to the Stewardship Incentive Program for riparian buffer restoration efforts. Twenty-two projects were completed establishing over ten miles of riparian forest buffers.

Riparian buffer restoration within the Chesapeake Bay watershed continues. An estimated 300 miles of buffers meeting minimum criteria have been established and restored within the Susquehanna River basin.

The Chesapeake Bay Program's Forestry workgroup has developed a video.

Problem: Eighty (80) percent of Pennsylvania's 13 million acres of private forestland is not under any kind of written management plan. The use of a riparian management zone is absent from many timber harvesting operations.

g. ❖ **Milestone:** By 2004, provide 10 new education/outreach/awareness activities that include riparian forest management zones. Write 150 new woodlot management plans by 2002. Increase by 10% the number of management plans that include riparian management zones.

Lead Agency: DCNR - BOF

Cooperating Agencies: CDs, PSCE, PA Stream ReLeaf, SFI of PA, USDA-FS

Implementation Steps:

1. ❖ Encourage the use of riparian management zones in woodland management plans.
2. ❖ By 2000, develop landowner workshops on riparian forest management zones.

Accomplishments:

Six tree-planting workshops were conducted in 2001 to encourage good riparian management practices. The DCNR Bureau of Forestry, Alliance for the Chesapeake Bay (ACB), and the Chesapeake Bay Foundation participated in these landowner workshops.

Problem: 80 percent of Pennsylvania's 13 million acres of private forestland is not under any kind of written management plan. Incentives are needed to encourage landowners to practice good stewardship.

h. **Milestone:** Guidelines for Woodlot Management Plan developed for industry to adopt on all harvesting operations. What number of timber harvesting operations utilized a woodlot management plan.

Lead Agencies: SFI, PCPF

Cooperating Agencies: DCNR – BOF, CDs, PSCE, PACD, PFA, USDA-FS, RC&Ds, ACF

Implementation Steps:

1. Develop a woodland management plan that jointly qualifies for SFI, Tree Farm Program, and Stewardship Program for forest landowners to use prior to all timber operations by 2004.

Accomplishments:

All of the major forestry programs in the state are promoting landowner outreach and education efforts to develop sound woodland management plans.

Problem: There is a lack of adequate funding and staff to implement this action plan.

- i. **Milestone:** Adequate funding to accomplish the above mentioned silviculture tasks.

Lead Agencies: DCNR, USDA – FS, Penn DOT, SCC

Cooperating Agencies: PSCE, USEPA

Implementation Steps:

1. Increase funding for Forest Stewardship Program (FSP) and Stewardship Incentive Program.
2. Establish a Pennsylvania Forest Trust Fund where all pollution fines from forest-related pollution and private contributions are deposited.
3. Develop a strategy to fund water quality forest practices through methods other than direct public funding.

Accomplishments:

The Forest Stewardship Program is not adequately funded. Approximately \$694,000 was received in FY2000 to fund several programs. FY2001 funding levels were not available.

The PA Forest Trust Fund is a long-range goal.

Are there any developments on a strategy? It looks like a federal, state, private landowner / industry partnership is the only way to achieve this goal. Maybe no news is good news.

List of Partners for Managing NPS Challenges from Silviculture

ACB	Alliance for Chesapeake Bay
ACF	Association of Consulting Foresters
CDs	Conservation Districts
DCNR BOF	Bureau of Forestry

DCNR BSP	Bureau of State Parks
HDC	Hardwood Development Council
NRCS	Natural Resource Conservation Service
PACD	Pennsylvania Association of Conservation Districts
PCPF	Pennsylvania Council of Professional Foresters
PDSAF	Pennsylvania Division of the Society of American Foresters
PFA	Pennsylvania Forestry Association
PFB	PA Farm Bureau
PSCE	Penn State Cooperative Extension
PA Stream ReLeaf	PA DEP and DCNR
PennDOT	PA Department of Transportation
PTU	Pennsylvania Trout Unlimited
RC&D	Resource Conservation and Development
SCC	State Conservation Commission
SFI of PA	Sustainable Forestry Initiative of PA
SFSC	State Forest Stewardship Committee
SRBC	Susquehanna River Basin Commission
USDA	US Department of Agriculture-Forest Service
USEPA	US Environmental Protection Agency

HYDROLOGIC/HABITAT MODIFICATIONS Action Plan

This is a comprehensive list. Not all these tasks can be achieved within the next five years.

The pollution prevention initiatives are indicated by this symbol ❖ . Pollution prevention is important to nonpoint source management because it involves preventing pollution from occurring at its source, before it is generated and has to be disposed of, or cleaned up.

Problem: Piecemeal planning and permitting of stream restoration is costly and inefficient. Currently, stream restoration projects are permitted on a site-by-site basis. Obvious evidence of channel impairment may be indicative of upstream land-use practices, yet valuable resources of both time and money are often expended through site-by-site restoration that repairs the obvious symptom while the cause of the impairment continues to exist. Stream restoration projects need to be part of a coordinated, holistic approach that considers fluvial geomorphology in its attempts to remediate nonpoint-source contamination within the watershed.

a. **Milestone:** By 2004, complete 5 watershed-wide restoration plans that consider the fluvial-geomorphology of the stream in addition to the remediation of the other nonpoint-sources pollution.

Lead Agency: DEP

Cooperating Agencies: CDs, DCNR, Municipalities, NRCS, SRBC, USACOE, USGS, Watershed Associations

Implementation Steps:

1. Research and document efforts in other states and agencies that promote watershed-wide restoration efforts.
2. Consider the use of fluvial geomorphology in evaluating and restoring streams.
3. Inventory and prioritize watershed needs for restoration (refer to Unified Watershed Assessment in Section III). Target high-priority and/or low-activity watersheds.
4. Incorporate permitting and programmatic flexibility and coordination in federal, state, and local regulatory programs to facilitate watershed wide restoration and management plans.
5. Include watershed water-quality improvement in the planning process.
6. Develop a comprehensive set of regional curves for Pennsylvania for use in stream restoration design.
7. Establish a reference reach network and conduct annual monitoring to quantify stability of each reach for use in natural stream design
8. Establish a database of restored stream channel locations and reference reach locations.
9. Establish consistent monitoring protocol and database for reference reaches and post-hydromodification monitoring of stream channel characteristics and riparian buffers.
10. Conduct long-term (5-year) monitoring of selected streams and riparian buffers before and after hydromodification of the stream channel and riparian improvements.

Accomplishments:

Stream Restoration and Assessment

The PA DEP Bureau of Waterways Engineering (BWE) has designed and constructed multiple stream restoration projects using FGM principles, especially in the north-central part of the state. Projects have been completed on Bentley Creek, Bradford County and on Martins Creek, Susquehanna County.

Five (5) watershed assessments have been completed using Fluvial Geomorphology (FGM) stream classification procedures. These assessments covered the South Branch Codorus Creek (68 square miles), East Branch Codorus Creek (44 square miles), Brock Creek (7 square miles) McLaughlin Run (7 square miles), and Letort Spring Run (22 square miles). A sixth watershed assessment for the Cowanshannock Creek (64 square miles) is currently in progress and should be completed by early 2001.

A project design based on FGM was initiated by BWE for Spring Brook, Pittston Township, Luzerne County. Watershed data was collected and reference reaches identified, and calculations for a regional curve were begun. Final design and construction is scheduled for 2002.

The BWE has initiated an effort to look at existing flood protection projects and consider using FGM and related principles to help increase channel stability, reduce sediment deposition, and enhance aquatic ecological characteristics.

An engineering feasibility study for flood protection along the Raystown Branch Juniata River at New Baltimore Borough, Somerset County has been initiated by BWE. The project involves levees that would be set far back on the flood plain with channel stability/restoration measures based on FGM.

A contract was executed with a consultant to determine the feasibility of a natural stream restoration project within the Department's existing flood protection project on Little Toby Creek in the Borough of Brockway, Jefferson County. The flood protection project was constructed in 1959. The purpose of the work would be to stabilize the stream within the confines of the levee system, increase sediment transport and reduce the frequency and costs of maintenance dredging.

A stream bank stabilization project was completed on St Clair Run, Lower Yoder Township, Cambria County, using a cable concrete installation. Cable concrete is an articulated mat of concrete blocks connected with steel cables. The porous system prevents further erosion and bank failure. Vegetation grows through the spaces between the blocks that are either backfilled or fill naturally with sediment.

PennDOT, Engineering District 9-0 has designed FGM measures and principles into the design of the Plank Road Widening project. It is located close to the District Office which will allow the frequent monitoring of the effectiveness of the various measures. PennDOT is also identifying additional potential FGM projects, and has received approval to expend \$40,000 from the Strategic Environmental Management Program (SEMP) initiative.

Comprehensive modular approach to watershed assessments is still being developed by the USGS. Fluvial geomorphology and water budget modules are in review. Watershed assessment modules for sediment, habitat, biotic integrity, water quality, and GIS support for basin characteristics are either in draft format or in development.

Funding

Both the 319 NPS program and the Growing Greener Initiative have funded watershed wide restoration projects. For a complete listing of stream restoration projects refer to Appendix A Natural Stream Channel Design Projects and Appendix 2 Bio-engineering Projects.

Regional Curve Development

A Regional Hydraulic Geometry Curve has been developed for the South and East Branches of Codorus Creek as well as McLaughlin Run and Letort Spring Run. Natural channel design best management practices (BMPs) were developed and restoration efforts are underway.

Regional curves for the Piedmont Lowland were completed by USGS under a joint funding agreement with BWE, and a reference reach has been characterized for an FGM-based stream restoration project on Bermudian Creek in Adams County.

The USGS has published regional curves for non-urban Piedmont lowlands. Field work has been completed by USGS personnel at gages in the non-urban Piedmont Uplands and data are being analyzed. USGS personnel are assessing Gages in the non-urban Ridge and Valley provinces.

Training

To date, approximately 125 people, including many Conservation District Watershed Specialists, have participated in the three-day Introductory Course on Natural Stream Channel Design presented by the Bradford County Conservation District. This course is not meant to replace Dave Rosgen's course but rather to prepare participants to hit the ground running if and when they do take the Rosgen Level 1 course. A second objective of the course is to enable DEP and Conservation District staff to understand the terms and concepts of natural stream channel design using fluvial geomorphology. A third goal is to impress participants with "hands on" experience in data collection and the need for the rigorous data collection associated with natural stream channel design projects. Textbooks are provided by Pennsylvania Association of Conservation Districts through Section 319 Grant.

To date approximately 20% of BWE technical staff have taken various levels of the Rosgen Training.

Canaan Valley Institute has also received a Technical Assistance Grant to develop and deliver training on Natural Stream Channel Design and Coordinate the third annual stream summit.

Stream Classification

The PA DEP, BWE has been directed to include, as a minimum, a Rosgen stream classification in each flood protection feasibility study, and to considered applying FGM-based design where possible, including stabilization/restoration of reaches upstream and downstream of structural flood protection projects.

Monitoring

Streambank erosion is being monitored on the East Branch Codorus Creek, McLaughlin Run, and the Cowanshannock Creek projects.

The Bureau of Watershed Management's, Citizens' Volunteer Monitoring Program is working with the Upper Saint Clair Citizen's for Land Stewardship to monitor an FGM project on McLaughlin Run in Allegheny County. The group has been trained in monitoring techniques for water chemistry, biological monitoring, habitat assessment, flow and FGM monitoring with assistance from Skelly and Loy.

Watershed monitoring was implemented on the South Branch Codorus Creek. Streambank erosion monitoring utilizes documented cross sections and bank erosion pins. One monitoring site has been restored (SBCC 026) and will be monitored. A second monitoring site will be restored in Spring 2002 and will be monitored post-construction. The York Chapter of the Izaak Walton League and the Aquatic Resource Restoration Company are committed to train and utilize volunteers for monitoring.

A stream relocation and two stream stabilization projects are being monitored by USGS staff for the stream channel response or the collection of baseline data in preparation for the restoration effort.

Permitting

A watershed based Joint Permit Application was prepared and approved for watershed restoration efforts using FGM. This permit application covers several best management practices that utilize natural stream channel design elements. This is a work in progress.

Problem: Dysfunctional dams present concerns to safety and environment. Approximately 3200 dams are operational and maintained throughout Pennsylvania. The original purpose of many smaller dams was for water supply, hydropower, gristmill operations, and ice harvesting. Many of these dams are now only used for passive recreation or serve no useful purpose at all. As these dams age, they suffer from neglect and deterioration and become public safety hazards and continue to block migration and spawning of anadromous fish.

b. **Milestone:** Remove 30 dams by 2004 and increase the number of miles of fish passage.

Lead Agency: BWE and PFBC

Cooperating Agencies: Natural Academy of Science, American Rivers Foundation

Implementation Steps:

1. Support funding and implementation of projects involving breaching and removal of orphaned and unused dams, and construction of fish passages.
2. Educate land developers, municipal authorities and the general public on the hazards of low-head dams and the benefits of removing those that are no longer useful.

Accomplishments:

Low-head Dam Removal

The BWE encouraged the removal of dams by streamlining the regulatory permit process through the use of the stream restoration permit waiver (25 Pa. Code Section 105.12(a)(16)).

The PA DEP, Bureau of Waterways Engineering (BWE) issued authorization to remove or breach 9 dams during 2001.

The BWE and Pennsylvania Fish and Boat Commission completed the removal of Good Hope Dam from the Conodoguinet Creek in Hampden Township, Cumberland County in November 2001. Baseline data were collected prior to removal of the Good Hope Dam to document channel morphology, macroinvertebrate and fish communities, and particle distribution and habitat. The initial post monitoring assessment has been completed.

Since 1995, approximately 50 dams have been removed under DEP's restoration waiver. A stream relocation and two stream stabilization projects are being monitored by USGS staff for the stream channel response or the collection of baseline data in preparation for the restoration effort.

Aquatic Resource Restoration

The Susquehanna River Anadromous Fish Restoration Cooperative, of which SRBC is a member, has been working with the power companies to restore American shad and other migratory fish species to the Susquehanna River. This year, passage was provided at the most upstream of the four (4) power dams on the lower Susquehanna River, making the main stem of the river available to American shad migration as far upstream as Sunbury, Pennsylvania. A significant portion of the Juniata River also was made accessible to shad migration.

Education and Outreach

The PA DEP, BWE published a fact sheet concerning the breaching or removal of dams.

The PA DEP, BWE issued a fact sheet in 1999 concerning the liability and responsibility of dam owners.

Problem: Poor planning of culverts and bridges results in stream channel instability. Present methods of sizing replacement structures for culverts or bridges tend to focus on problems in the immediate project area and that area upstream of the proposed project. The downstream area is sometimes overlooked which can result in destabilizing of downstream channel sections causing erosion of the existing stream banks and sedimentation of the stream channel. Fish passage

through culvert structures can be prohibitive or limited depending on the design. Finally, there is minimal consideration given to nonpoint source pollution improvements when designing or replacing existing bridges or culverts.

c. **Milestone:** By 2004, establish monitoring to document less downstream erosion and flood damage and more stable stream habitat after culvert/bridge replacement. By the year 2005, implement fish passage designs within all new culvert replacement structures that transport waterways with >100 acres of drainage area.

Lead Agency: DEP, PennDOT

Cooperating Agencies: DCED, DCNR, NRCS, PF&BC, PSU, SRBC, USGS

Implementation Steps:

1. Investigate and utilize research/experiences from academia/other states to improve the design process of replacing culverts, bridges and other structures by considering a watershed approach to flooding and erosion problems.
2. Gather and analyze historical data on stream flow, channel conditions and floodplain conditions to aid in the design of replacement structures located in the river environment. Design proposed structure to eliminate/minimize any flooding problems, ice or debris problems, or scour problems that are known to exist at existing structures.
3. Gather and analyze the data to document the change in downstream flooding.
4. Develop new design standards to improve fish passage through box and pipe culvert structures.
5. Identify best management practices to minimize NPS impacts to the stream.

Accomplishments:

Research

More than 13,800 bridge sites throughout Pennsylvania have been field assessed for bridge scour and channel stability in the vicinity of the bridge as part of the USGS Bridge Scour project.

Design Standard Development

Design efforts using FGM principles to adapt bridge and culvert openings to prevent sediment accumulation or excess scour are also underway. The Pennsylvania State University is also completing hydraulic flume research using in-stream structures such as rock vanes and cross-rock vanes in order to improve sediment transport through bridges.

The Pennsylvania DEP, Pennsylvania Fish and Boat Commission, and PennDOT have developed new design standards to improve fish passage through culverts, pipes and small structures. The PennDOT constructed two culverts as part of the S.R. 36 Safety Improvement Project in Blair County utilizing these new guidelines. In addition, culverts associated with the S.R. 30 Safety Improvement Project in Fulton County are currently being designed using these new guidelines.

Education and Outreach

PennDOT District 9-0 Bridge Unit Staff conducted a Hydrology and Hydraulics workshop. The workshop included an overview of current regulations and permit requirements. Attendees were introduced to the Pennsylvania Handbook of Best Management Practices for Developing Areas manual. An overview of the Watershed Management Software (WMS) program showing Channel Routing/Reservoir Routing was given.

Problem: Poor habitat evaluation criteria for determining minimum dam releases. Present methods for determining instream flow requirements downstream of dams and diversions are based on outdated methods that are not scientifically based. Major strides have been made in recent years in evaluating the effects of instream flow losses on wild trout habitat on coldwater streams with a drainage area less than 100 mi² through the development of the Pennsylvania/Maryland Instream Flow Model. This model is limited, however, in that it is designed only for relatively small, coldwater streams. Larger coldwater streams and warmwater streams cannot be evaluated with this model. Furthermore, the effects of groundwater withdrawals on instream flows are poorly understood, yet recent regulatory changes affecting treatment of surface waters is causing many municipal water supply companies to move from surface to groundwater sources.

d. **Milestone:** By 2004 develop and implement procedures that will make possible the evaluation of aquatic habitat loss due to instream flow impacts resulting from surface water and groundwater withdrawals on a statewide basis.

Lead Agencies: PFBC and DEP

Cooperating Agencies: SRBC, DRBC

Implementation steps:

1. Develop a reservoir operations model that can be added to the PA/MD Instream Flow Model. This will streamline the use of this model for use on dams, which have significant storage capacities. The model is currently designed primarily for use on stream diversions where storage is minimal.
2. Conduct a statewide instream flow study on warmwater streams and develop a model for these systems analogous to the PA/MD Instream Flow Model. Planning is now underway in southeastern PA through the DRBC to plan such a study for the streams in that region.
3. Conduct studies, and support university research designed to understand the effects of groundwater pumping on surface water flow with the goal of developing instream flow protection guidance for groundwater withdrawal projects.

Accomplishments:

Model Development

There is much interest in southeastern PA in the development of a regional in-stream flow model for warm water streams. Also, the DRBC is in the process of reevaluating in-stream flow management throughout the Delaware River Basin.

The USGS is conducting a modeling project to simulate current conditions and potential long-term pumping and to quantify the impact of pumping on ground-water levels and stream flow for the French Creek Basin.

Monitoring

The PA DEP is beginning to require more surface water monitoring during pump tests for Public Water Supply permit applications for wells. This information has been used in some occasions to set passby flow limits on streams that are influenced by the pumping. These changes are the result of the Environmental Hearing Board adjudication in the case of Oley Township, et al. v Commonwealth of Pennsylvania, Department of Environmental Protection and Wissahickon Spring Water, Inc. Permittee. This case involved the proposed pumping of groundwater by a bottled water company. The withdrawals had the potential to adversely affect adjacent Exceptional Value wetlands.

Problem: Lack of floodplain management at the municipal level. There is a severe lack of knowledge, tools and enforcement utilized by local municipalities in regulating existing floodplains. This has resulted in the development/modification of floodways and floodplains. Additionally, municipalities have found that the FEMA maps are inadequate in that they do not include many of the smaller streams.

e. **Milestone:** By 2004, increase by 25% the number of municipalities effectively implementing floodplain management over the 1999 baseline. Increase by 10% annually the number of "community assisted visits and contacts" to municipalities. Increase by 10% annually the number of people attending floodplain and stormwater management training.

Lead Agencies: DCED, DEP

Cooperating Agencies: CDs, FEMA, NRCS, PEMA, PSU, SRBC

Implementation Steps:

1. Educate municipalities through "community assisted visits and contacts" to 50 percent of Pennsylvania's municipalities by 2002. (CD pilot). Provide annual certification training for those individuals responsible for administering the local floodplain and stormwater management programs. Recommend that individuals attend refresher courses every two to four years based on educational background.
2. Conservation Districts and municipalities provide to FEMA, through DCED, a list of problem smaller streams that should be mapped.
3. Identify resource needs for floodplain management at the local level.

4. Compile, update and maintain currently available tools necessary for floodplain management at the local level.
5. By 2004, develop a GIS data base of streams in municipalities having detailed FEMA studies, watersheds with detailed Stormwater Management Plans, communities without detailed FEMA studies having ordinances that supercede DEP's and FEMA's allowable 1' increase, etc.
6. Develop videos and other innovative tools for local governments on:
 - land use planning
 - stormwater management
 - floodplain management
 - overview of stream classification/restoration and
 - maintenance of dirt and gravel roads in high quality/exceptional value watersheds

Accomplishments:

Floodplain Monitoring

Pennsylvania's County Conservation Districts and the Pennsylvania Department of Community and Economic Development (DCED) have been collaborating on the Floodplain Monitoring project since 1997. Since the pilot phase began, many communities have benefited. New working relationships between county conservation districts and municipal governments have been made and are helping conservation district/municipal cooperation extend into areas such as the Dirt and Gravel Roads Pollution Prevention Project. The DCED has offered the program to additional districts. Fifteen (15) conservation districts joined the Floodplain Monitoring project during Spring 1999 under Phase II. With this increased participation, the program has now expanded in scope from the Susquehanna River basin to all parts of the state. Most of the 22 districts met with officials of all of the municipalities listed on their contracts. The mentoring program expanded, as more of the pilot districts coached newer districts. The mentoring program has enabled pilot districts to improve working relationships between PACD member districts. The 15 conservation districts that joined the program in 1999 have made 227 contacts for the Floodplain Monitoring Project in the past two years. More information can be found at <http://www.fema.gov>.

The USGS continues to conduct flood insurance studies to delineate selected 100- and 500-year floodplains.

Discussions have been initiated to increase communication and collaboration between the BWE's flood protection program, PEMA's hazard mitigation program and DCED's flood plain management/ flood insurance program, under the umbrella of DEP's Environmental Futures (EFP2) planning initiative. The EFP2 goal is the reduction of lives lost and property damage due to flooding.

Flood Protection

Flood protection projects completed in 2001 include: Wadham Creek in Plymouth Borough, Luzerne County; Blacklick Creek in Nanty Glo Borough, Cambria County; St. Clair Run in the City of Johnstown, Cambria County; Mill Creek in the City of Wilkes-Barre, Luzerne County; and Hazel Dyke in the City of Lebanon, Lebanon County. Projects currently under construction are Brush Creek Phase 1 in the City of Jeannette, Westmoreland County; Tributary to Lick Run in Baldwin Borough, Allegheny County; and Hicks Creek in Exeter Borough, Luzerne County.

Problem: Lack of stream buffers exacerbates nonpoint source pollution. Riparian buffers protect the streams of Pennsylvania, filter NPS pollution, prevent thermal pollution, protect the stream banks from erosion, and provide aquatic habitat and food sources for aquatic life. Development, farming and other activities pose a serious threat and have seriously degraded riparian areas.

f. **Milestone:** By 2001, establish a procedure to track the number of stream miles with new buffers and the number of miles of riparian buffers saved from destruction through the permit review process.

Lead Agencies: DEP, DCNR

Cooperating Agencies: ACB, CDs, NRCS, PennDOT, PF&BC, PGC, PSU, SRBC, USF&WS, Watershed Groups

Implementation Steps:

1. Promote coordinated information to the general public on the value of buffers, protection of existing buffers, and the establishment of new stream buffers.
2. Target special watershed locations for demonstrations on the values of buffers for improving/protecting water quality in each county.
3. Explore funding for purchasing buffer easements on critical streams areas. Promote the Conservation Reserve Enhancement Program (CREP).
4. Restore and conserve riparian buffers wherever feasible along all waterbodies statewide.

Accomplishments:

Outreach

- The Alliance for the Chesapeake Bay (ACB) provides free information packets on riparian forest buffers. ACB also has developed both general and technical presentations on riparian buffers for citizens' groups. They continue to give these presentations on request (this effort has been funded through Pennsylvania's Clean Water Fund). The Forest Buffer Toolkit was reprinted with Section 319 funds.
- The Delaware Riverkeeper has been funded through Pennsylvania's Coastal Nonpoint Pollution Program to develop a document "Stream Restoration in Pennsylvania: Ten Case Studies." They also developed a brochure "25 Ways to Protect Your Stream and Streamside Property", which continues to be distributed at meetings and conferences.
- A pilot advertising campaign to promote buffer establishment and conservation in residential properties will begin in March 2001. The campaign will consist of radio and

print advertising and will provide data to determine the effectiveness of this outreach strategy.

Riparian Buffer Implementation

- The DEP BWE provided financial assistance to the Bradford County Conservation District to establish riparian buffers along the Bentley Creek as part of Phase I FGM restoration.
- The Pennsylvania Game Commission and PennDOT installed approximately 40,000 feet of streambank fencing as part of a mitigation project for the Meyersdale Bypass in Somerset County. In addition, PennDOT began to incorporate riparian restoration and conservation measures into its project design and mitigation using native trees, shrubs and warm season grasses.
- At least four Growing Greener grant projects involving riparian restoration were completed.
- In 2001, Pennsylvania implemented over 403 miles of buffers, 266 miles of them in the Chesapeake Bay Watershed. The Conservation Reserve Enhancement Program (CREP) has been instrumental in establishing buffers 35 feet or wider on agricultural lands.

Training

- In 2001, DEP provided two technical training sessions on riparian buffers for staff from DEP, DCNR, conservation districts, and NRCS. Stroud Water Research Center helped to deliver the training. Sessions were held at the Research Center and at the Izaak Walton League in York County.
- *In 2001, DEP developed and delivered three training courses “Plants for Riparian Corridors” to DEP Regional staff in our Southcentral, Southeast and Northeast Regional Offices. Project Advisors for Growing Greener grants involving stream and stream corridor restoration, and PennDOT district staff were the primary audience. PennDOT, DCNR and a Southcentral Regional Office Watershed Manager partnered in delivering the course.*
- In 2001, DCNR provided six workshops across the state on tree-planting techniques.

Riparian Corridor Assessment

The Heritage Conservancy with funding from the Coastal Nonpoint Pollution Program is assessing southeastern Pennsylvania riparian corridors, developing GIS coverage to identify areas in need of restoration, and working with local groups and governments to provide technical assistance.

The Academy of Natural Sciences using a Growing Greener grant is conducting a riparian buffer assessment to determine threshold buffer levels below which water quality deteriorates.

The Penn State University, PA Trout, PFBC and Canaan Valley Institute are developing a riparian buffer assessment protocol. PA Trout members and CVMP volunteers are testing the protocol.

The USGS continues to monitor survivability, percent cover of herbaceous and woody species, species richness, and diversity of riparian buffers for some PennDOT mitigation projects.

Riparian Buffer Seedling Project

The PA DCNR and the Department of Corrections developed a tree-seedling nursery program at state prisons. The program provides native tree seedlings to watershed groups for riparian buffer restoration projects.

Problem: Wetland destruction adversely impacts the hydrology and NPS pollution load to streams. Wetlands provide an important role in filtering out NPS pollutants before they reach the streams.

g. **Milestone:** Annually increase by 100 acres the number of wetland acres protected, created or restored.

Lead Agency: DEP

Cooperating Agencies: CDs, DCNR, PennDOT, NRCS, PF&BC, PGC, PSU, SRBC, USACOE, USF&WS

Implementation Steps:

1. Discourage the impoundment of natural wetlands for stormwater management.
2. Coordinate and promote, through field days and demonstration projects, the use of created wetlands in road ditch outlets and in stormwater facilities to improve water quality and wildlife habitat.
3. Develop partnerships with private industry to promote construction of wetlands for NPS abatement.
4. Support funding to create wetlands to abate NPS pollution.
5. Educate people about the purposes of wetlands and the need to protect existing wetlands.

Accomplishments:

Wetland Restoration

In FY 2000, 177 acres of wetlands were restored/created through partnership with state and federal agencies. See Appendix C for annual accomplishments.

The USGS continues to monitor through systematic vegetative sampling, newly created wetlands as part of some PennDOT mitigation projects.

Problem: Lack of consistency in policies among agencies hinders implementation of effective stream restoration projects.

h. **Milestone:** The national Stream Corridor Restoration Handbook appended for Pennsylvania as a cooperative endeavor of all members of the NPS Hydromodification Workgroup. Number of workshops held to provide training to technical service providers (consultants, academia, local, state and federal agencies) on the use of the Stream Corridor Restoration Handbook. Number of agencies using Pennsylvania's appended Stream Corridor Restoration Handbook and the Best Management Practices Handbook For Developing Areas.

Lead Agencies: CDs, DCED, DCNR, DEP, NRCS, PF&BC, PGC, PennDOT, SRBC, USACOE, USF&WS, USGS

Implementation Steps:

1. By 2001, establish an interagency training team to provide in-house workshops.
2. By 2004, provide 12 workshops on the Stream Corridor Restoration Handbook.
3. By 2002, develop a user friendly streambank restoration guide for local groups.

Accomplishments:

Outreach

Pennsylvania's Keystone Stream Team (KST) coordinated by Canaan Valley Institute has held two Natural Stream Channel Design Summits. The KST has also been developing Pennsylvania's guidelines for Natural Stream Channel Design.

The 3rd Stream Summit is scheduled for April 25-27 and focuses on the permit process.

Canaan Valley Institute received a Growing Greener Technical Assistance Grant to develop curricula for workshops on the watershed approach to Natural Stream Channel Design using fluvial geomorphology.

For a list of stream restoration projects in Pennsylvania refer to Appendix A Natural Stream Channel Design Projects and Appendix B Bio-engineering Projects.

List of Partners for Managing NPS Challenges of Hydromodification Activities

ASFPM	Association of Flood Plain Managers
DCED	Department of Community and Economic Development
DCNR-BSP	Bureau of State Parks
DCNR-BFD&C	Bureau of Facility and Design
DEP	Department of Environmental Protection
DRBC	Delaware River Basin Commission
HUD	U.S. Department of Housing and Urban Development
ICPRB	Interstate Commission Potomac River Basin
NRCS	Natural Resources Conservation Service (USDA)
PACD	Pennsylvania Association of Conservation Districts
PennDOT	Pennsylvania Department of Transportation
PEMA	Pennsylvania Emergency Management Agency
PF&BC	Pennsylvania Fish & Boat Commission
PSCE	Penn State Cooperative Extension
PGC	Pennsylvania Game Commission
SRBC	Susquehanna River Basin Commission
USACOE	U.S. Environmental Protection Agency
USF&WS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Municipalities, watershed associations and conservation districts are key organizations in managing NPS challenges in hydromodification activities at the grassroots level.

Lakes Management NPS Action Plan (Section 314 Federal Clean Water Act)

Problem: There are numerous methods currently being utilized, along with many others that are being developed, to address the unique interaction of the physical aspects of lake water quality available. Considering the individual aspects of each lake, the lake manager needs to be able to utilize these options to effectively address restoration. Currently there is no "one book" reference for lake management and restoration.

a. **Milestone:** By 2003, develop a *PA Best Management Handbook for Lake Management* that includes innovative and traditional approaches to lake management and restoration.

Lead Agency: DEP

Cooperating Agencies: PACD, PALMS, PFBC, PRWA, USCOE

Implementation Steps:

1. Develop more flexibility in permitting various in-lake management options to include innovative approaches to lake restoration.
2. Develop more flexibility in providing funding to address lake restoration efforts in identified high value lakes.
3. Promote innovative approaches to lake restoration through research and information exchange.
4. Educate homeowners in lake watersheds on lake dynamics as well as lake management.

Accomplishments

Funding

The new Growing Greener and the Dirt and Gravel Road Programs have opened up a lot more funding opportunities for both restoration and protection initiatives. All "classifications" of lakes have benefited through these programs, including privately owned and operated lakes. Additionally, the 319 Program now has Watershed Protection Projects that can fund lake protection measures as a part of Watershed Protection Projects.

The new Growing Greener Program has opened up more funding opportunities for research of new and innovative lake restoration and management alternatives.

PALMS recently obtained funding through a Growing Greener Program grant that will be used to develop a new, improved website that will feature all available lake and watershed management information and will provide links to obtain additional information from other notable websites. In addition, this grant will allow PALMS to cosponsor conferences/workshops throughout the Commonwealth that are relevant to proper lake management. PALMS also obtained funding to develop a lake management BMP manual for use in trainings, outreach and conferences. This BMP manual will be completed by 2003.

Outreach and Training

PALMS conferences and workshops are held each year. State-of-the-art and innovative approaches for watershed and lakes management are presented for discussion. A quarterly newsletter features many innovative lake and watershed management techniques and alternatives. A series of lake and watershed management fact sheets has been produced and are made available at all PALMS functions and upon request.

The PALMS website, <http://community.pennlive.com/cc/lakes>, provides information on lake management issues. The PALMS website also provides a link to the North American Lake Management Society (NALMS) where additional information may be obtained. A direct email address is also available for questions and answers.

The Lake Wallenpaupack Watershed Management District (LWWMD) holds seminars, gives local presentations, prepares newsletters, and disseminates Fact Sheets on lake management practices. There are continuing annual opportunities for this information exchange. Additionally, the LWWMD has a new website, <http://www.lwwmd.org>, that provides numerous lake and watershed management resources.

PALMS held its annual symposium on October 11 and 12, 2001. The Western PA Conservancy (WPC) holds an annual symposium to increase awareness of watershed stewardship issues. Their first symposium was held on April 1, 2000 and a second was held in Spring 2001.

The Pocono Northeast RC&D, with cooperation from the Susquehanna and Bradford County Conservation Districts, provided training on lake and pond management. The last two in a series of six workshops were given at weekly sessions at Keystone College in the Spring of 2001.

The Pike County Conservation District provided two 1-day training sessions on March 17 and August 11, 2001 for citizen water quality monitors. Workshops included lake ecology and lake management topics.

The PA Association of Conservation Districts (PACD) developed five (5) fact sheets specific to homeowner practices that can protect lakes and lake water quality. These fact sheets are available from the PA DEP.

The Crawford County Conservation District has been working with the Conneaut Lake Aquatic Management Association (CLAMA). They have distributed a quarterly newsletter on lake management issues and have developed 4 fact sheets on Conneaut Lake. Both Pinchot Lake (York County) and Lake Wallenpaupack (Pike County) held lake celebration events to educate lake homeowners and watershed stakeholders about current watershed and lake issues. Both events involved the community in a variety of events. Both lakes have been active in implementing BMPs in the watershed using diverse funding.

Needs / Challenges

- The Pennsylvania Lakes Management Society (PALMS) can recommend innovative and conventional management alternatives through the annual conference, workshops, and direct communication. The annual conference helps educate all about state-of-the-art and innovative methods and implementation techniques involved.
- Institute a 'Weed Watchers Program' to assist with the identification, tracking, and documentation of both native and exotic aquatic plant species. This should be a volunteer initiative.
- Expand the PALMS website to enhance the information & technology transfer capabilities.
- Develop regulatory guidance allowing the use of alum (aluminum sulfate) as batch or continuous addition treatments for water quality improvement in lakes.
- Develop the Handbook with cooperation from other agencies and organizations. Funding has been secured to accomplish this task over the next two years. Permitting issues need to be addressed as part of the Handbook.
- Develop a lake classification system pertaining to PA Code, Title 25, Chapter 93 Water Quality Standards. Lakes are currently not differentiated from their basin classification. This may restrict the use of waivers and general permits for lake management activities, requiring more costly permits that otherwise would not be necessary. For example, a statewide General Permit 4 for Intake and Outfall Structures may not be used in water bodies classified as "High Quality" or "Exceptional Value." This may not be the appropriate classification for a lake within a "basin" classified as such. The present classification scheme also results in many lakes listed as "impaired" on the 303(d) list, based on water quality standards and use classification, when in fact they are not impaired.
- Require aquatic herbicide applicators to address threatened and endangered species through the existing application permit process. Aquatic herbicide permits for applicators (including property owners) should get blanket mailings with their permit on PNDI species to increase awareness. A guidebook needs to be developed as well as fact sheets.
- Require either lake associations or aquatic herbicide applicators to provide newspaper notification prior to herbicide application.
- Research and develop regulatory guidance for using alum as an in-lake restoration alternative.
- PALMS needs to begin a dialogue for recommendations on how the state can oversee alum treatments in Lakes.

Problem: The regulatory definition of a "significant" lake is not adequate. Each lake is a unique interaction of chemical, biological and physical elements. Lakes in Pennsylvania are currently classified primarily in relationship to their watershed classification and a determination as a "significant" lake. "Significant" lakes are defined under regulatory language as those containing specific retention characteristics as well as public access. There are numerous private community owned lakes and access restricted public water supplies that are of importance to the Commonwealth. Additionally, the "significance" and "importance" of a lake needs to reflect the region in which it occurs.

b. Milestone: By 2002, develop a comprehensive PA Lakes Classification System.

Lead Agency: DEP

Cooperating Agencies: DCNR, PALMS, PRWA, USGS

Implementation Steps:

1. By 2000, revisit definition of "significant" lakes and review other agencies definition of lakes to better define. Consider necessary changes to regulations (Chapter 101).
2. By 2001, develop a comprehensive list of all significant lakes as defined.
3. Develop a comprehensive list of "important" lakes, considering public, private community, drinking water and other lakes that do not qualify under the definition of "significant" but are of value to the Commonwealth and local communities.
4. By 2003, develop a lakes classification system that is separate from the streams classification system that considers regional differences.
5. Both public and private lakes should be eligible for restoration and technical assistance because they are all waters of the Commonwealth and can affect downstream water quality.

Accomplishments

Lakes Classification

PALMS reviewed the definition and the problem as part a project to develop a Pennsylvania Lakes database. Lakes were reported in 2 categories: "significant" to encompass the regulatory definition, and "important" to encompass those without public access, including private lakes and water supply reservoirs, and those not meeting the flow requirements of a 14-day retention time. The term "significant" was derived from, 1) EPA's requirement that public funds be spent only on lakes with public access, and 2) Pennsylvania's Chapter 101 definition of a "lake" being a body of water with a retention time of at least 14 days. Therefore since "significant" lakes are relatively few in number, the term "important" lake should have equal consideration so that most of PA lakes are recognized. The fact that *any* impaired lake can be placed on the 303d list, will have a TMDL developed, and is then eligible for federal funding for restoration supports this position.

PALMS completed a comprehensive list of all "significant" and "important" lakes as currently defined in December 2000. The PA DEP maintains and updates these lists.

Funding

Lake restoration projects are eligible for funds under the new Growing Greener Initiative and the Section 319 NPS program.

Needs / Challenges

- Re-evaluate and possibly revise the definition of "lake" in Chapter 101.
- The Lakes Classification System was urged by PALMS and needs to be discussed in 2002. The DEP needs to reclassify according to use category, ecoregion, and origin. The PA Fish and Boat Commission now classifies lakes by fishery and could lend expertise on this issue.

Problem: Currently there is no single comprehensive source of educational, informational or technical assistance in the assessment and management of lakes. There is a great deal of educational and technical information available from many sources. What is needed is a central clearinghouse and directory.

c. ❖ **Milestone:** By 2003, establish a technical and educational clearinghouse of information to address lake management and restoration and provide outreach to public and private lake managers and owners.

Lead Agency: PALMS

Implementation Steps:

1. ❖ By 2003, develop a comprehensive directory of available technical, educational and informational assistance for lake management.
2. ❖ By 2003, develop a Pennsylvania specific Best Management Practices (BMPs) Handbook for Lake Management.
3. ❖ By 2003, develop a technical assistance strategy for watershed/lake associations and public water supplies.
4. ❖ Continue annual PALMS Conference to provide technical and educational outreach to address current water quality concerns and issues.

Accomplishments

PALMS Conference

Over the past few years PALMS added a third day to the conference to provide citizens' monitoring training specific to lakes. This training was provided in cooperation with PALMS, the PA DEP-Citizens Volunteer Monitoring Program and the Canaan Valley Institute.

Funding

The Growing Greener Initiative has provided support for the annual conference for two years.

Needs / Challenges

- Establish a new PALMS website to accommodate a technical and educational "clearinghouse" function. PALMS received a Growing Greener grant in 2001 that will allow establishment of a more comprehensive website in 2002. The website is being developed as of December 2001.
- The DEP Source Water Assessment and Protection (SWAP) program will help to accomplish this goal.

Problem: There is no standard minimum chemical, biological and physical assessment criteria related to the lake classification system. The unique interactions of the chemical, biological and physical aspects of lakes create water quality conditions that are often independent from those of contributory streams.

d. **Milestone:** By 2003 develop specific NPS TMDL criteria for lakes to reflect lake processes, which differ from streams.

Lead Agencies: DEP, PRWA

Cooperating Agency: USGS

Implementation Steps:

1. Identify seasonal lake cycles that affect water quality.
2. Develop language that addresses lake water quality concerns.

Accomplishments

Outreach

PALMS published and produced a new fact sheet that explains seasonal lake cycles in December 2000. Conferences and workshops regularly highlight this subject to help educate lake users. PALMS produced two new fact sheets on water quality issues relating to lakes. One covers water quality parameter values and ranges, and one covers temperature/dissolved oxygen profiles.

Needs / Challenges

- Recommend adding a Step 3. To develop specific NPS criteria for lakes.

Lake Cycles

Provide this information with supporting graphics on the PALMS website.

Water Quality Criteria

Chapter 93 criteria need to be revised specifically for lakes using unique uses and classification, and specifically for dissolved oxygen and temperature criteria by depth profile, so that lakes do not get listed as “impaired” because of stream designated criteria.

The DEP submitted lake data to the USGS and the EPA for use in developing nutrient criteria for lakes in Pennsylvania ecoregions. This should provide guidelines on total phosphorus, total nitrogen, chlorophyll a and secchi readings for lakes. This task is being complete with FY2002 104b3 grant funds.

A dialogue among agencies (PFBC, DEP, DCNR, ACOE) is needed to reach a scientifically based consensus on what indicates “impairment” in a lake.

Problem: Lakeshore erosion is a major contributor to the degradation of water quality, as well as, designated uses of lakes in Pennsylvania. Specific BMP guidelines are needed to control lakeshore erosion.

e. **Milestone:** By 2002, develop specific BMP guidelines for controlling lakeshore erosion.

Lead Agencies: DEP, PALMS, NRCS

Cooperating Agency: DCNR-BSP and BFD&C, USGS

Implementation Steps:

1. Identify lake, shoreline and watershed activities that contribute to shoreline erosion.

2. ❖ Identify or develop specific BMPs to address shoreline erosion.

Accomplishments

Research

Numerous studies have been done on the causes of shoreline erosion.

Outreach

The Pennsylvania Association of Conservation Districts (PACD) has developed five (5) fact sheets covering various aspects of lake management; topics include goose control, septic systems management, shoreline buffers, fertilizers and pesticides, and home and yard care.

Chapter 6217 of the Coastal Zone Act Reauthorization Amendment (CZARA) has identified shoreline erosion causes and funded projects addressing these problems on Lake Erie.

A multitude of shoreline stabilization and restoration BMPs have been developed, implemented, and monitored to date, and the designs and specifications are widely available.

The LWWMD is currently developing a Shoreline Restoration Handbook that will address various lake shoreline stabilization and restoration techniques including bioengineering, structural stabilization, and combination, or bio-structural stabilization. Permitting concerns will be addressed as part of this handbook.

The Penn State Cooperative Extension *Pond Management Handbook* addresses many shoreline management and stabilization alternatives.

Chapter 6217 of CZARA provides information in the form of brochures, workshops, education and outreach and grant funding for best management practice implementation for the Lake Erie watershed.

The USDA, Natural Resource Conservation Service provides technical guidance and information on shoreline stabilization designs and techniques.

Needs / Challenges

- Conduct a comprehensive review of the available literature on the causes of shoreline erosion and compile all applicable documentation for later use.
- PALMS will develop the *Lake Management Handbook* which will address the causes of lake shoreline erosion and will provide comprehensive guidance for the selection, design, implementation, and permitting for all applicable BMPs. Funding was obtained through the Growing Greener Initiative for this project to be completed in 2003.

Problem: Exotic species such as the zebra mussel have the potential to change the chemical, biological and physical aspects of Pennsylvania lakes as well as their identified uses. A strategy for Pennsylvania is needed to help insure the restriction of currently introduced species as well as controlling the introduction of new species.

f. **Milestone:** By 2004, develop a clearly defined strategy to control and mitigate exotic species.

Lead Agencies: DEP, PALMS

Cooperating Agencies: DCNR, USGS, DRBC, SRBC, ICPRRB, ORSANCO, PF&BC

Implementation Steps:

1. By 2001, identify current exotic species and assess their impacts on lake uses.
2. ❖ By 2002, develop specific strategies to control current exotics and the prevention of future introduction of exotics.

Accomplishments

Outreach

The DEP produced an educational display on zebra mussels that was used at the PALMS and Growing Greener conferences during 2000 and 2001.

The National Oceanographic and Atmospheric Administration (NOAA), Sea Grant Program has developed fact sheets and brochures on the problems associated with several exotic species including zebra mussels, quagga mussels, Asiatic clam, rusty crayfish, spiny water flea, and round goby.

Exotic Species

The Morris Arboretum is under task to survey and report on the distribution of native and exotic aquatic plants in Pocono region lakes.

The Western PA Conservancy has completed aquatic flora and fauna survey work in the 6 western glacial lakes to document presence and extent of native and exotic species.

No significant work has been completed to date. The DEP has produced some posters and guidance on zebra mussels but there is not an established program.

Needs / Challenges

- Develop a database for monitoring exotic flora and fauna in Pennsylvania using existing GIS mapping and other available information.
- The Aquatic Weed Advisory Committee (AQWAC) and the DEP-Citizens Volunteer Monitoring Program (CVMP) need to organize a formal citizens' weed watching program in the next year or so. In 2001, the CVMP developed a Weed Watcher's guidance document for volunteers to use on their lakes but no specific training is provided.
- Locate and/or develop and distribute articles & fact sheets to raise public awareness on this issue.
- Continue to work with state agencies in northeastern states that are developing or implementing similar monitoring strategies.
- More education and outreach on exotic species is needed. Pertinent organizations need to obtain and distribute literature, brochures and other environmental educational materials to PA citizens and lakes users to prevent the spread of exotic species. Information specific to Pennsylvania needs to be researched and developed.
- Develop the *Lake Management Handbook* through PALMS. The Handbook will address the identification, prevention, and control of exotic aquatic flora and fauna.

Partners for Managing Lake Management NPS Challenges

DCNR-BSP	Bureau of State Parks
DCNR-BFD&C	Bureau of Facility Design and Construction
DEP	Department of Environmental Protection
DRBC	Delaware River Basin Commission
ICPRB	Interstate Commission on the Potomac River Basin
NRCS	Natural Resources Conservation Service (USDA)
PACD	Pennsylvania Association of Conservation Districts
PALMS	Pennsylvania Lake Management Society
PF&BC	Pennsylvania Fish & Boat Commission
PGC	Pennsylvania Game Commission
PSCE	Penn State Cooperative Extension
PRWA	Pennsylvania Rural Water Association
SRBC	Susquehanna River Basin Commission
USACOE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USF&WS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Municipalities, watershed associations, conservation districts and lake associations are key organizations in managing NPS challenges in lake management at the grassroots level.

VI. Pennsylvania Nonpoint Source Success Stories

1. 2001 Watershed Education Projects Funded By WREN (an innovative approach)

With the belief that coalitions build credibility in the community and allow for greater communication, increased creativity and better use of financial and human resources, the WREN grant program requires each funded project to be conducted by two or more community partners. In July 2001, WREN selected 13 community partnerships through a competitive grant application process to receive funding to undertake public education projects in their local watersheds. These partnerships include local officials, businesses, agencies, and citizen groups that are stakeholders in the initiative to protect the local water resources. Following are descriptions of the 2001 projects and the outreach activities each will conduct with its partners by June 30, 2002:

- **Schuylkill Headwaters Association** will for each of the seventeen school districts in Schuylkill County, purchase the program entitled "*The Watershed Tour*" and will distribute reagent refill kits.
- **Pittsburgh Voyager** will travel to outlying Pittsburgh area regions via a Voyager vessel, equipped with a learning laboratory, to educate students of Greene County about watersheds and environment in their area.
- **Shermans Creek Conservation Association** will produce a newsletter, fact sheets, and traveling program about the Shermans Creek watershed in Perry County. SCCA will also improve the on-going water quality monitoring program, from which data will be available through a newsletter to local citizens.
- **Delaware River Greenway** will coordinate a cleanup of the Delaware River and conduct an educational environmental festival on the same day.
- **Lake City Environmental Advisory Council** will develop and distribute a variety of written educational materials to the citizens in Lake City, Erie County.
- **Tioga County Conservation District** will offer water quality testing kits to county farmers who attend a water quality workshop to learn about nonpoint source pollution and other water quality issues.
- **Glinodo Earth Force** will recruit and train at least fifteen Erie County educators who will work with students to initiate water resources protection projects in their watershed with a focus on youth decision-making, civic action, watershed focus and community problem-solving. At the end of their projects, students will participate in the Earth Force Youth Summit designed to reinforce civic engagement.
- **Lower Merion Conservancy** in Montgomery County will write, produce and print a brochure entitled "*Safeguarding Our Streams*" which will be distributed to Township

residents and other interested parties. The partners will also co-produce a live television town meeting on the local cable access.

- **Pike County Office of Community and Planning and Human Development** will hold public workshops on watershed ecology, surface and groundwater quality, homeowner conservation measures, and how to work with local decision-makers. Partners will also produce fact sheets and educational modules for high schools in county.
- **AMD & ART, Inc.** will convert a local church into an educational center, hold community workshops, and conduct school programming.
- **Wysox Creek Watershed Association** in Bradford County will produce and distribute a newsletter and develop and implement a watershed wide monitoring plan.
- **Bushkill Stream Conservancy** will produce a Visitor's Guide which will inform tourists visiting the Northampton County watershed and how to protect it. The coalition will also prepare a multi-media presentation with the same focus as the Visitors Guide.
- **Wheeling Creek Watershed Conservancy** will develop a brochure and website that will feature results from stream testing in the Greene County watershed.

2. Villanova University – Innovative Environmental Stormwater Management On Campus

Pennsylvania environmental management agency, the Department of Environmental Protection (DEP), has recognized that when it comes to stormwater, just designing for floods is no longer adequate, and the focus needs to expand to include stream channel protection, quality and "recharge" of groundwater. In fact, recharging groundwater locally and pollutant removal have become as much or more important than simple flood control from the inhabitants perspective (plant, people and critters). FMO and the Department of Civil Engineering have retrofitting several areas on campus as part of PaDEP Growing Greener and Section 319 research projects. These innovative Stormwater facilities are termed "Best Management Practices" (BMP), and are used in Villanova's graduate and undergraduate Civil Engineering program.

Stormwater Basin Conversion to Wetland

The University's first venture into the heightened stormwater environmental focus was modifying an existing detention basin obscurely located between the Law School's rear parking lot and Facilities Management's Maintenance Building.

Civil Engineering Department's Dr. Robert Traver designed a retrofit for the stormwater wetland that treats runoff from a 41-acre section of the campus that includes 16 acres of pavement and buildings. The basin is part of Mill Creek's headwater. Funding was provided by Pennsylvania DEP's 319 (Non-Point Source Pollutant) Grant. The proposal and design included additional plant material, a new outlet (discharge) means that essentially provides a meandering flowpath in contrast to the original under drain pipes. Surrounding vegetation and wildlife are benefactors both within sight of the retention pond and downstream.

With a drainage area that is 40 percent impervious, most studies have rated such sites as “dead.” The stormwater wetlands appears to have reversed most of these effects, with hawks, frogs, foxes, macroinvertebrates, bird life and students all enjoying the basin. The site has been instrumented to collect flow data, and already numerous presentations and tours have been conducted. Educational signage has been installed to enhance the learning experience. In October 2001, a statewide symposium was held at Villanova, which showcased the project. Future research focusing on the pollutant removal and hydraulic performance of stormwater wetlands is planned for the future.

Installation was coordinated with Chuck Leeds, chief horticulturist and Steve DiValerio of FMO. The basin was rebuilt in the fall of 1990, planted the following, spring. Leeds designed the plantings. While the project was funded by a “319” grant through PaDEP, besides donating the land, Villanova contribute heavily to the project. The Delaware River Keepers donated some additional funding to help add even more plantings.

Bioinfiltration Traffic Island

Pennsylvania DEP’s response to Villanova’s wetland initiative was highly favorable. Villanova was selected to design, built and conduct research on a second innovative stormwater project funded through “**Growing Greener**”. Again Villanova donated the land and matched close to 50% of the costs.

An existing West Campus traffic island has recently been retrofitted into a bioinfiltration “bed.” It intercepts flows that normally would be collected by inlets and delivered through culverts to a dry detention basin without chance to cleanse or infiltrate the stormwater runoff. The drainage area encompasses approximately one acre, mostly pavement. The island is designed to control smaller storms (1-1.5 inches), allowing the runoff to infiltrate, reducing downstream stormwater volumes, stream bank erosion, and nonpoint source pollution to the headwaters of the Darby Creek. The advantage of this type of facility is the capture and infiltration of more than 90 percent of our annual rainfall, thus reducing stream bank erosion and maintaining baseflow. There is no pollutant input to the headwaters from these storm events. FMO’s contractor screened the existing soil to remove aggregates and other foreign matter, then combined it with sand. The resultant mixture is very porous, but adequately stable (resists erosion).

During larger storms (2-100 year storms) a significant portion of the rainfall, as well as the first flush of pollutants would be removed by the bioretention area (termed Best Management Practice). Flows in excess of the capacity of the BMP would either go through the original culvert systems to a dry detention pond or overflow the curb to enter an adjacent inlet.

Traver’s plan is to incorporate these two projects and future designs into a “Best Management Practice” Demonstration Park which will join the retrofitted stormwater wetlands already constructed. Each BMP located within the park will have educational signs, and be easily accessible. Several local organizations including the Lower Merion Conservancy and the Delaware River Keepers are supportive of this effort. To verify project performance, rainfall and groundwater depth will be monitored for three months following construction. All results will be included in the final report, and will be made available through Villanova’s stormwater web site.

Bartley Quad

Traver and Leo Kob worked with the design committee last year to incorporate a pervious pavement system. Rather straightforward in theory, the actual design is complicated by the presence of numerous existing underground utilities and the need for the quad to provide considerable shading and access for emergency vehicles.

Rather than continuing to collect surface water runoff in traditional inlets and deliver the water in large-diameter underground pipes to the municipal storm drainage system, the area will allow water to soak through the pavement into a deep stone bed below.

This system will retain the capacity of an average thunderstorm. Heavy storms will require runoff to be collected in the traditional manner. Building roof drains will be redirected from underground discharge to the surface, thereby **reestablishing the original water cycle**. Instrument wells and continuing research are also part of this project. Again this project has being funded through the PaDEP 319 project, with Villanova contributing to the project.

Over fall break, Villanova hosted a statewide symposium attended by over 200 environmental specialists. After addressing the group Pennsylvania Secretary of Environmental Protection, David E. Hess, praised VU's Growing Greener and 319 NPS projects in his remarks to the conference. This followed last summer's symposium for township supervisors and engineers hosted at Villanova on the new NPDES II regulations. Villanova usually holds an at cost session on current topics of stormwater management every summer, and hosts the statewide symposium every two years.

3. Little Hefren Run Passive Treatment System

Little Hefren Run is the only degraded tributary of the Chapter 93 designated Exceptional Value Toms Run watershed, a tributary of the Clarion River. Toms Run flows through Cook Forest State Park, in Clarion County. The source of the discharge is believed to be abandoned surface and deep coal mines located 1000's of feet upslope of the discharge breakout point. The mine drainage is likely flowing through abandoned oil and gas wells or springs in the sandstone underlying the mines.

A passive mine drainage treatment system was completed in fall 2000 with \$128,932 in funding from the federal Clean Water Act, Section 319 program. The treatment system consists of an anoxic limestone drain (ALD), which is a buried bed of limestone aggregate under oxygen-free conditions, a sedimentation pond and a polishing wetland. The goals of project were to the raise pH and eliminate iron precipitate in 1000 feet of Little Hefren Run and eliminate iron staining in downstream Toms Run.

The ALD treatment system produces net alkaline water with a low iron concentration. The pH and alkalinity of Little Hefren Run has increased since construction of the treatment system. The pH is 5 to 6, with low metals and net alkaline conditions below the treatment system; the pre-treatment pH ranged from 3.0 to 5.0.

4. Catawissa Creek Oneida #1 Mine Discharge Passive Treatment System

The Oneida #1 discharge is located in Schuylkill County. The discharge is the second largest discharge in the Catawissa Creek watershed and the only mine discharge in upper Sugarloaf Creek watershed. The discharge has a pH ranging from 3.6 to 4.2 and aluminum of 1.4 to 4.9 mg/l. The discharge degrades 5.5 miles of Sugarloaf Creek and Lake Choctaw, a lake in the Eagle Rock Resort, and contributes to the degradation of 10.6 miles of Tomhickon Creek, downstream of the mouth of Sugarloaf Creek.

The Oneida #1 passive treatment system consists of several oxic limestone drains (OLD), which are buried beds of limestone aggregate under oxygenated conditions, and a sedimentation pond. Construction was completed in summer 2001. The treatment system discharges water with near neutral pH, alkalinity of 50 mg/l, and a negligible amount of aluminum. The treatment system has changed conditions in Lake Choctaw and Sugarloaf Creek from acidic to alkaline and is also expected to improve the water quality of Tomhickon Creek.

The total cost of the treatment system was \$370,000. The project was sponsored by the Schuylkill County Conservation District with support from the Eastern Coalition for Abandoned Mine Reclamation's (EPCAMR) Regional Watershed Support Initiative, the Catawissa Creek Restoration Association, DEP Bureau of Abandoned Mine Reclamation Wilkes Barre Office, and the Eagle Rock Homeowners Association.

6. Educating the Public About Nonpoint Source Pollution

The Pennsylvania Association of Conservation Districts, Inc. (PACD) is working to increase the public's understanding of issues related Nonpoint Source pollution. With financial support provided by the U.S. Environmental Protection Agency's Section 319 Program, PACD conducts a number of educational activities that address the roles local officials, farmers, teachers, and the general public play in preventing nonpoint source pollution.

With the help of county conservation districts, the PACD effectively supports grass roots efforts such as workshops, field days, tours, and special marketing and promotional activities by providing information, materials, and in some instances, funding.

PACD's Nonpoint Source related brochures and facts sheets are distributed at local and statewide events. Its loan library consists of exhibits and supporting materials, videos, and other audio visual items. PACD's website, "Your Link to Local Conservation Efforts," provides visitors access to conservation district activities as well as special statewide events. Loan materials can be pre-viewed and educational print materials can be downloaded directly from the site.

PACD continues to administer the popular Educational Mini-Projects program. The program provides up to \$1000 for grassroots efforts that encourage target audiences to take action to help reduce nonpoint source pollution.

Currently, PACD is administering 16 different mini-projects hosted by conservation districts, schools and watershed organizations. Funds are used to support a variety of projects ranging from developing displays to conducting workshops

7. The Narrows Bioengineering Project in Adams County

The project involved the stabilization of approximately 800 feet of stream bank with native rock and root wads on the Conewago Creek just north of Arendtsville, Adams County. The project also involved the planting of trees to improve the aesthetics of the site and to further aid in stabilization.

The root wads and rock provided the large, heavy material necessary to stabilize the toe of the eroding slope and prevent further undercutting. The root wad structures were placed approximately 8-12 feet into the stream from the existing stream bank. This allows the new stream bank to be built at a more stable slope without cutting back into either landowner's ground. The building of new stream banks was done with gravel material removed from the adjacent stream bank. This process "softened" this stream bank allowing the stream to "move" away from the newly stabilized banks. Nine varieties of trees for planting were donated and planted by the Adams County Trout Unlimited. They were chosen based on the tree species around the sites. A local distributor donated half of the erosion control matting with the other half sold at cost. The Conservation District seeded the site with an annual ryegrass. Annual ryegrass was chosen to serve as a fast yet temporary cover until natural re-vegetation could begin.

Nearly 800 feet of stream bank was stabilized for approximately \$25,000; a much cheaper and more aesthetically pleasing approach compared to the standard riprap solution. The concept of bioengineering has received very good publicity and has raised the awareness of the possibilities of this technique on even the most extreme cases.

8. Swatara Creek

Water Quality Concern:

Coal mine drainage (CMD) from abandoned mines has affected more than 2,400 miles of streams and associated ground water in Pennsylvania. Approximately half the discharges from bituminous and anthracite coal mines in Pennsylvania are acidic, having pH <5.0. Acidic CMD typically contains elevated concentrations of dissolved sulfate (SO_4^{2-}), dissolved and particulate iron (Fe), and other metals produced by the oxidation of pyrite (FeS_2). Elevated concentrations of sulfate and metals in mine drainage and receiving streams make the water unfit for most uses. Losses of surface water to, and CMD from abandoned anthracite mines within the northern 43 mi² of the 576-mi² Swatara Creek Basin degrade the aquatic ecosystem and impair uses of Swatara Creek to its mouth on the Susquehanna River 70 miles downstream from the mined area.

Project Description:

To neutralize the acidic CMD and reduce the transport of dissolved metals in the Swatara Creek watershed, innovative passive-treatment systems are being implemented and monitored in the 43 mi² northern Swatara Creek Basin. These treatment systems include limestone-sand dosing, open limestone channels, anoxic and oxic limestone drains, limestone diversion wells, and

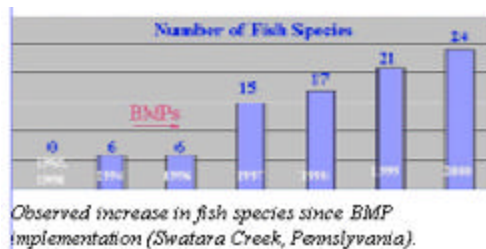
limestone-based wetlands. The performance of these new and existing treatment systems is being evaluated using upstream/downstream and before/after monitoring schemes.

Key Successes and Lessons Learned:

- The anoxic limestone drain near the headwaters of Swatara Creek has shown the greatest benefit to water quality, producing significant improvements in pH and alkalinity, measurable several miles downstream.
- The diversion wells show great potential to treat stormflow, which generally is more acidic than baseflow. u Wetlands attenuated dissolved and particulate metals, but had negligible effects on pH, alkalinity, and sulfate.

Alkalinity-producing systems, such as limestone diversion wells or limestone drains combined with wetlands or settling basins, generally are needed to attenuate metals transport.

- Open limestone channel and limestone sand dosing had negligible effect on water quality.
- The precipitation process has a detrimental side effect of putting sludge with high metal content in the bottom of the creeks.



Appendix A

Natural Stream Channel Design Initiatives in Pennsylvania ¹¹

These projects have been made possible through the Keystone Stream Team (KST) and partners. Natural Stream Channel Design techniques are used to stabilize stream channel and bank. Natural Stream Channel design projects are distinctly different from flood control projects in scope and function. The primary goals of natural stream channel design projects are to restore stream habitat and stream channels to more natural geomorphologic features.

The following projects have been initiated throughout the Commonwealth. The respective watershed and county, sponsors, providers of funding and design services, construction and equipment providers, and project descriptions are given for each project.

Please note the information on these projects is for the purpose of locating projects in or near your watershed. Please remember that these projects are often constructed on private property, so please respect the rights of the landowners and contact the sponsors for a field visit. ¹²

Ohio River Basin

Allegheny River - Turtle Point, McKean County

Sponsors: NRCS, USFWS, Annin Township

Funding: USFWS, Annin Township

Design: USFWS, NRCS

Equipment Operators: USFWS

Project Description: The USFWS and NRCS assisted the township with a project to protect 500 feet of vertical river bank. The township could not fund a proposed riprap project costing over \$40,000. The McKean County landfill donated stone, Annin Township donated hauling and the USFWS constructed three 125 foot rock vanes. Total project costs were under \$10,000.

Completion/Construction Date: Summer 1999

Brokenstraw Creek, Warren County

Brokenstraw Creek Restoration Project

Sponsors: PA DEP, Warren CCD, California University of PA, USFWS, NRCS

Funding: Growing Greener Grant

Design: USFWS

Construction: USFWS

Project Description: This project will stabilize about 1000 feet of Brokenstraw Creek where it has broken through its bank and flooded a public highway.

Completion/Construction Date: 2002

¹¹ Projects completed, under construction, or planned as of December 6, 2001.

¹² Canaan Valley Institute

McLaughlin Run, Allegheny County

McLaughlin Run Watershed Assessment

Sponsor: Upper St. Clair Township

Funding: DEP Section 319, EPA

Design: Skelly and Loy, Inc.

Project Description: Assessment of entire urbanized watershed completed to identify and map impaired streams. All streams were assessed for degree of impairment and stream type using Rosgen classification method. GIS map was developed to show location and condition of all streams and tributaries. Project included: development of regional hydraulic curve, and preparation of prioritized restoration plan.

McLaughlin Run Demonstration and Stream Restoration

Sponsor: Upper St. Clair Township

Funding: DEP Section 319, EPA

Contractor/Design: Skelly and Loy, Inc., Permitting - Gateway Engineering

Project Description: Restoration of 1,000 feet of severely impaired stream using natural channel design. The stream is located in highly urbanized watershed and has downcut to bedrock. Restoration included bank stabilization with in-stream rock structures, installation of rock bank protection, creation of riffle/pool features and riparian plantings.

Susquehanna River basin

Bentley Creek and Fall Creek - Ridgebury Township, Bradford County

Bentley Creek - Reach 1

Sponsors: USFWS, Bentley Creek Watershed Association, Bradford County CD

Funding: USFWS

Design/Construction: Dover Habitat Restoration, LLC and Steady Stream Hydrology

Project Description: Restore 3,500 feet of stream channel in glacial moraine geology.

Completion/Construction Date: Fall 1999

Bentley Creek - Ridgebury Township, Bradford County

Reach 2

Sponsors: USFWS, Bentley Creek Watershed Association, Bradford County CD

Funding: DEP 319 grant, EPA

Design: USFWS

Construction: USFWS, PA DEP, and Gleim Excavating

Project Description: Restore 3,500 feet of stream channel in glacial moraine geology.

Completion/Construction Date: Fall 2000

Reach 3

Sponsors: USFWS, Bentley Creek Watershed Association, Bradford County CD
Funding: Growing Greener Grant
Design: USFWS
Construction: USFWS, PA DEP, and Gleim Excavating
Project Description: Restore 12,000 feet of stream channel in glacial moraine geology.
Completion/Construction Date: July 2001

Reach 4

Sponsors: USFWS, Bentley Creek Watershed Association, Bradford County CD
Funding: Growing Greener Grant
Design: USFWS
Construction: USFWS and John Gleim Excavating
Project Description: Restore 11,000 feet of stream channel in glacial moraine geology.

Bentley Creek, Chemung County, NY

Reach 5

Funding: Chemung County. Soil and Water Conservation District
Design: USFWS
Construction: USFWS
Project Description: Restore 5,280 feet of stream channel in glacial moraine geology. This project is located in Wellsburg, NY within an existing flood control project. Final design will depend on the extent of planned improvements to the dike system by the NRCS.
Completion/Construction Date: Planned.

Big Bear Creek - Plunketts Creek Township, Lycoming County

Big Bear Creek Restoration - Reach 1

Sponsors: USFWS, Dunwoody-Big Bear Hunting and Fishing Club
Funding: USFWS, Hawbaker Construction, PA DEP
Design: USFWS
Construction: USFWS
Project Description: Restore 3500 feet of wild trout stream that was degraded by removal of a 100 year old dam and release of coarse sediment into the channel, construct with extreme flood from Hurricane Agnes and three other severe storms and inappropriate fish habitat projects.
Completion/Construction Date: Fall 1999

Reach 2

Sponsors: USFWS, Dunwoody-Big Bear Hunting and Fishing Club, Lycoming County CD
Funding: USFWS, Growing Greener Grant, Hawbaker Construction.
Design: USFWS
Construction: USFWS, PA DEP, John Gleim Excavating
Project Description: Restore 6,500 feet of wild trout stream that was degraded by removal of a 100 year old dam and release of coarse sediment into the channel, construct with extreme flood from Hurricane Agnes and three other severe storms and inappropriate fish habitat projects.

Completion/Construction Date: Fall 2000

Reach 3

Sponsors: USFWS, Dunwoody-Big Bear Hunting and Fishing Club

Funding: USFWS, Growing Greener Grant, Hawbaker Construction

Design: USFWS

Construction: USFWS, Gleim Excavating

Project Description: Restore 10,800 feet of wild trout stream that was degraded by removal of a 100 year old dam and release of coarse sediment into the channel, construct with extreme flood from Hurricane Agnes and three other severe storms and inappropriate fish habitat projects.

Completion/Construction Date: Fall 2001

Catawissa Creek - Unnamed Tributary, Schuylkill County

Catawissa Creek Restoration Project

Sponsors: Pennsylvania Department of Transportation

Funding: Pennsylvania Department of Transportation

Design: USFWS

Construction: USFWS, PennDOT

Project Description: About 250 feet of stream will be stabilized with rock vanes in place of rip-rap that was unsuccessful in stabilizing stream bank.

Completion/Construction: 2001-2002

Chickies Creek, Lancaster County

Chickies Creek Watershed Assessment

Sponsor: Chickies Creek Watershed Association

Funding:

Design\Build Contractors: LandStudies, Inc.

Project Description: Restoration project prioritization, channel feature data collection.

Conestoga River, Lancaster County

Conestoga River Initiative: 5+ major tributaries to Conestoga River

Sponsor: Lancaster County Conservation District

Funding: DEP Section 319, EPA

Design\Build Contractors: LandStudies, Inc.

Project Description: Establishing initial sediment erosion rates based on cross sectional comparisons of 15 stream reaches over 1-3 bankfull flow events. Channel evolution process and comparisons documented at stable, degraded, and transitional channel reaches.

Completion/Construction: 2002

Codorus Creek - East Branch, York County

Watershed Assessment / Restoration

Sponsor: The Izaak Walton League of America, York Chapter 67

Funding: DEP Section 319, EPA

Design: Skelly and Loy Inc.

Equipment Operators : Ross Excavating

Project Description: Watershed assessment of 45 square mile watershed (105 miles of stream) was completed. All streams were assessed for degree of impairment and stream type using Rosgen classification method. GIS map was developed to show location and condition of all streams and tributaries. Project included: development of regional hydraulic curve, stream bank erosion monitoring, sediment sampling, design, permit and construction of FGM demonstration project (1,340 feet), and preparation of prioritized restoration plan.

Janice Brown Restoration site

Sponsor: The Izaak Walton League of America, York Chapter 67

Funding: DEP Section 319, EPA

Design: Skelly and Loy Inc.

Equipment Operators : Ross Excavating

Project Description: FGM demonstration project involving over 1,340 feet of restoration of severely impaired stream. Bank erosion and channel migration. Project is in design phase and will include installation of rock vanes, “J” hook vanes, cross vanes, root wads, bank grading, channel shaping and riparian plantings.

Codorus Creek – South Branch, York County

Watershed Assessment / Restoration

Sponsor: The Izaak Walton League of America, York Chapter 67

Funding: DEP Section 319, EPA

Design: Skelly and Loy, Inc.

Project Description: Assessed 68 square mile watershed (148 linear miles of stream). All streams were assessed for degree of impairment and stream type using FGM classification method. A GIS map was developed to show location and condition of all streams and tributaries. Project included developing a regional hydraulic curve, stream bank erosion monitoring, sediment sampling, and preparing a restoration plan with prioritized restoration sites.

Completion/Construction: 2000

New Freedom Borough Restoration site

Sponsor: The Izaak Walton League of America, York Chapter 67

Funding:

Design: Skelly and Loy, Inc.

Equipment Operators: Ross Excavating

Project Description: Restoration of 500 feet of severely impaired stream. High stream banks are actively eroding and channel has split causing migration. Project currently being designed and permitted and will include installation of rock vanes, “J” hook vanes, cross vanes, root wads, rock toe protection, and 150 feet of channel reconstruction, and riparian plantings.

Construction/Completion: Planned

Circle K site

Sponsor: The Izaak Walton League of America, York Chapter 67

Funding: Growing Greener Grant

Design: Skelly and Loy, Inc.

Equipment Operators : Ross Excavating

Project Description: Restoration of 1,500 feet of severely impaired stream. Stream banks were actively eroding (6 feet high) and channel migration over 3 feet per year measured. Project included installation of rock vanes, "J" hook vanes, cross vanes, root wads, 400 feet of channel reconstruction, (2) cattle crossings, stream bank fencing and riparian plantings.

Construction/Completion: 2001

R.K. Smith site

Sponsor: The Izaak Walton League of America, York Chapter 67

Funding: DEP Section 319, EPA

Design: Skelly and Loy, Inc.

Project Description: FGM demonstration project involving over 800 feet of restoration of severely impaired stream. Bank erosion and channel migration over 40 feet in 15 years. Project included installation of rock vanes, "J" hook vanes, cross vanes, root wads, 80 feet of new channel construction and riparian plantings.

Construction/Completion: 2001

Dise Farm site

Sponsor: The Izaak Walton League of America, York Chapter 67

Funding: DEP Section 319, EPA

Design: Skelly and Loy, Inc.

Equipment Operators : Ross Excavating

Project Description: Restoration of 1,100 feet of severely impaired stream. Stream banks are actively eroding (4 feet high) and channel migration over 5 feet per year measured. Project currently being designed and permitted and will include installation of rock vanes, "J" hook vanes, cross vanes, root wads, rock toe protection, and 400 feet of channel reconstruction, and riparian plantings.

Construction/Completion: 2001

Elk Run - Gaines Township, Tioga County

Elk Run Restoration

Sponsors: Gaines Township Supervisors, PA DEP, USFWS

Funding: Growing Greener Grant

Design: USFWS, Gannett Fleming

Project Description: This project will stabilize 500 feet of stream bank that is at the base of a landslide that is threatening a township road. The top of the slope failure is located within 18 inches of the road.

Completion/Construction Date: Summer/Fall 2001

Ellen Run, Tioga County

Ellen Run Restoration

Sponsors: Borough of Mansfield, PA DEP

Funding:

Project Description: This project is still in the discussion phase. The stream will be restored with conventional hard engineering techniques or a natural stream channel design approach. Most of the parties involved favor a NSD approach. The FWS has offered to cooperate with the Borough, PA DEP, and Penn DOT on this project. It will involve about 3/4 mile of channel restoration with about half of the area in a constrained, entrenched channel bordered by development.

Completion/Construction Date: 2003

Fishing Creek, Columbia County

Fishing Creek Restoration Project

Sponsors: Fishing Creek Watershed Association, USFWS, NRCS

Funding: Growing Greener Grant

Design: USFWS

Construction: USFWS and Contractor

Project Description: This project will stabilize 1500 feet of vertical eroding stream bank and created a fishing area for disabled people.

Completion/Construction Date: Fall 2001

Hammer Creek, Lancaster County

Watershed Assessment

Sponsor: Hammer Creek Watershed Association

Funding: DEP Section 319

Design/Build Contractors: LandStudies, Inc.

Equipment Operators: Gleim Environmental

Project Description: 8-mile watershed assessment completed; 13 restoration projects prioritized and budgeted; 3000 feet constructed using FGM by USFWS and LandStudies, Inc.; 1-2 miles to be constructed in 1-3 years by LandStudies. Watershed permit submitted to DEP Regional Office.

Hammer Creek Restoration

Sponsor: Hammer Creek Watershed Association

Funding: Growing Greener Grant

Design/Build Contractors: LandStudies, Inc.

Project Description: 1000 feet stream restoration plan using FGM

Completion/Construction: 2001

Goode Farm - Reach 1

Sponsors: USFWS, Lancaster CCD, LandStudies, Inc.

Funding: USEPA, Chesapeake Bay Program

Design: USFWS

Construction: USFWS, John Gleim Excavating, LandStudies, Inc.

Project Description: Restoration of 1500 feet of a C4/C5 limestone stream degraded by a century of unrestricted cattle access. We narrowed the stream, installed J hook and cross vane and stabilized the banks with sod mat transplants and live stakes. The project has had two floods since construction and worked perfectly.

Completion/Construction Date: Fall 1999

Reach 2

Sponsors: USFWS, Lancaster CCD, Land Studies, Inc.

Funding: USEPA, Chesapeake Bay Program

Design: USFWS

Construction: USFWS, John Gleim Excavating, LandStudies, Inc.

Project Description: Restoration of 2000 feet of a C4/C5 limestone stream degraded by a century of unrestricted cattle access, we narrowed the stream, installed J hook and cross vane and stabilized the banks with sod mat transplants and live stakes. The project has had two floods since construction and worked perfectly.

Completion/Construction Date: Fall 2000

*Kettle Creek - Stewardson Township, Potter County***Kerlin site**

Sponsors: Kettle Creek Watershed Assoc., USFWS

Funding: PFBC, Trout Unlimited

Design: USFWS

Construction: USFWS

Project Description: This project stabilized 499.5 feet of severely eroding bank that threatened to cut off access to a parcel of property owned by the Kerlin family and also threatened State Route 144. We installed five J hook vanes on the outside of the meander and stabilized the banks with grass seed mulched with hay and geo-jute matting.

Completion/Construction Date: Fall 1999

PA Fish and Boat Commission site

Sponsors: PFBC, USFWS, Kettle Creek Chapter Trout Unlimited, Kettle Creek Watershed Association

Funding: PA DEP Growing Greener Grant, PFBC, USFWS, TU

Design: USFWS, PFBC

Construction: USFWS

Project Description: About 1500 feet of vertical eroding bank were treated with two cross vanes, a J hook vane, and a log vane, two root wads and several hundred feet of rock sill that was installed in the center of the project to allow for some scour on the outside of the meander bend to keep the overhead cover provided by the rock sill from silting in. The rock sills were made with large flat rocks set on footer rocks at the top of the water and sealed at the back with gravel

rolled in geo-textile fabric. The vertical banks were collapsed on the sill and seeded, mulched and covered with a geo-jute fabric.

Completion/Construction Date: Summer 2000

Headgate Reach site

Sponsors: USFWS, Kettle Creek Watershed Association, PennDOT

Funding: PA DEP Growing Greener Grant, PennDOT, Fish America Foundation

Design: USFWS (survey by PennDOT)

Construction: USFWS

Project Description: This reach is 2500 feet in length and contains several split channels, debris jams and eroding banks. The erosion could threaten State Route 144. Channels will be consolidated, cross vanes installed, J-hook rock vanes and other fish habitat enhancing structures installed.

Completion/Construction Date: Late Summer 2001

Kettle Creek, Clinton County

Deb's Restaurant site

Sponsors: Pennsylvania Fish and Boat Commission, Kettle Creek Watershed Association

Funding: PADEP Growing Greener, State Senator Jake Corman

Design: USFWS, NRCS

Construction: USFWS

Project Description: Two cross vanes and 1 J-hook were installed to protect 500 feet of stream bank and improve fish habitat.

Completion/Construction Date: Summer 2001

Kishacoquillas Creek - Soft Run tributary, Mifflin County

Belleville Stream Restoration

Sponsors: Village Pride, USFWS

Funding: DEP Section 319, EPA

Design: USFWS

Equipment Operators: Gleim Construction

Project Description: This project will reconstruct about 2,000 feet of an urban stream channel. Concrete walls and levees currently contain the stream. The plan includes removing the walls, and restoring a meandering stream and greenway through the town. Some buildings will be removed with FEMA funding.

Completion/Construction Date: 2003

Gitts Run - Unnamed Tributary, York County

L&H Trucking -Wetland and Stream Mitigation Project

Sponsor: L&H Trucking

Funding:

Design: Skelly and Loy Inc.

Equipment Operators: Conewago Contractors.

Project Description: Project involved wetland and stream mitigation to offset site development impacts. Project included 800 feet of channel reconstruction and floodplain restoration to unnamed tributary to Gitts Run. An “E” stream type was built using rock vanes, root wads.

Laurel Run and Oliver Run, Centre County

Laurel Run and Oliver Run Stream Relocation

Sponsor: PennDOT

Funding: PennDOT

Design: Skelly and Loy Inc.

Equipment Operators: New Enterprise Inc.

Project Description: Project involves the relocation of 850 feet of Laurel Run and 1,100 feet of Oliver Run using a natural channel design. Both streams are cold-water fisheries with reproducing trout populations. These streams are being relocated as a result of the I-99 highway construction project. The Laurel Run project is completed and included installation of rock vanes, J-hook rock vanes, cross vanes, root wads, and riparian plantings.

Completion/Construction: July 2002.

LeTort Spring Run, Cumberland County

LeTort Spring Run Watershed Assessment

Sponsor: Cumberland Valley Chapter, Trout Unlimited, Fred Bohls

Funding: Growing Greener Grant

Design: Skelly and Loy Inc. Gerald Longenecker (717) 232-0593

Project Description: Watershed assessment of 15 square mile watershed was completed. All streams were assessed for degree of impairment and stream type using Rosgen classification method. GIS map was developed to show location and condition of all streams and tributaries. Project included: development of regional hydraulic curve, and preparation of prioritized restoration plan.

Completion/Construction: 2001

Shady Lane site

Sponsor: Cumberland Valley Chapter Trout Unlimited

Funding: Growing Greener Grant

Design: Skelly and Loy, Inc.

Equipment Operators : Gleim Environmental Group

Project Description: Enhance 1,000 feet of LeTort Spring Run through habitat improvements. The reach of stream historically passed through a pasture and through channel widening aquatic habitat conditions degraded. Using a natural channel design the width/depth ratio will be

lowered (narrowed and deepened). The project is in the permitting phase. The project will include a new meandering channel within the existing wide channel, installation of rock vanes, root wads, mud sills, gravel spawning areas and riparian plantings.

Construction/Completion: Construction was scheduled for July 2001.

Limestone Run, Columbia and Montour Counties

Limestone Run Watershed Assessment / Restoration

Sponsors: Milton High School, USFWS, PA DEP

Funding: PA DEP Growing Greener Grant

Design: USFWS

Construction: USFWS

Project Description: This project includes an assessment of the watershed and riparian restoration of two miles of stream bank through stream bank fencing and riparian planting.

Completion/Construction Date: 2002

Lititz Run Watershed, Lancaster County

Lititz Run Watershed Restoration

Sponsors: Farmers First Bank, Sturgis Pretzel, Lititz Borough, Lititz Run Watershed Alliance (LRWA)

Funding: Farmers First Bank, Sturgis Pretzel, DEP Section 319, EPA

Design/Build Contractors: LandStudies, Inc.

Equipment Operators: Gleim Environmental

Project Description: 1 mile of stream constructed using FGM principles and an additional; 1-2 miles being designed; construction to occur in 1-3 years. Watershed Assessment Prepared and Watershed permit approved

Zug site

Sponsor: Lititz Run Watershed Alliance

Funding: DEP Section 319

Design/Build Contractors: LandStudies, Inc.

Project Description: 1500 + feet stream restoration using FGM

Completion/Construction: 2002

Banta site

Sponsor: Lititz Run Watershed Alliance

Funding: DEP Section 319

Design/Build Contractors: LandStudies, Inc.

Project Description: 3000 + feet stream restoration using FGM

Completion/Construction: 2002

Locust Street site

Sponsor: Lititz Run Watershed Alliance

Funding: DEP Section 319

Design/Build Contractors: LandStudies, Inc.

Project Description: 800 feet stream restoration project using FGM

Completion/Construction: 2002

Little Conestoga Creek, Lancaster County

Little Conestoga Creek Restoration Project

Sponsor: PA Power & Light

Funding:

Design/Build Contractors: LandStudies, Inc.

Equipment Operators: Gleim Environmental

Project Description: 750 feet stream restoration project using FGM

Completion/Construction: Planned

Martins Creek, Susquehanna County

Martins Creek Restoration Project

Sponsor: PA DEP, Bureau Waterways Engineering (BWE)

Design/Build Contractors: DEP-Stream Improvement Section

Funding: PA DEP

Equipment Operators: Gleim Environmental Group

Project Description: Martins Creek is a stocked trout stream that has exhibited severe bank erosion, despite past attempts to stabilize and improve it through regular gravel removal. DEP's Bureau of Waterways Engineering decided that Martins Creek would be a good candidate for its first NSCD project. The complete project stabilized about 1700 feet of channel and cost approximately \$48,000. During construction, rainfall produced conditions that tested the upper half of the project that had already been completed. The completed work sustained no damages and performed as anticipated.

Completion/Construction: 2001

Mount Rock Spring Creek, Cumberland County

Mount Rock Spring Creek Channel Restoration

Sponsor: Conodoguinet Creek Watershed Association

Funding: DEP Section 319, EPA

Design: Skelly and Loy, Inc.

Equipment Operators: Ross Excavating

Project Description: Approximately 800 feet of Mount Rock Spring Creek had been straightened and moved over 100 years ago to maximize available cattle pasture. The stream channel was relocated back to its approximate original location using a natural channel design. Project included 800 feet of new meandering channel, installation of rock vanes, "J" hook vanes, cross vanes, a cattle crossing, stream bank fencing and riparian plantings.

Completion/Construction: 2001

Paxton Creek, Dauphin County

Paxton Creek Watershed Assessment

Sponsor: City of Harrisburg

Funding: Growing Greener Grant

Design: Skelly and Loy, Inc.

Project Description: Assessing 27 square mile urbanized watershed located in Harrisburg. Frequent flooding and stream impairment are major concerns. All streams are being assessed for degree of impairment and stream type using FGM classification method. GIS mapping will be prepared to show location and condition of all streams and tributaries. Project will provide educational and monitoring opportunities through Harrisburg Area Community College and the Paxton Creek Watershed Association. Project includes: development of regional hydraulic curve, stream bank erosion monitoring, identification of storm water facilities, and preparation of prioritized restoration plan using a natural channel design approach.

Construction/Completion: Current.

Segloch Run, Lancaster County

Segloch Run Restoration

Sponsor: Donegal Chapter of Trout Unlimited

Funding: Trout Unlimited

Design/Build Contractors: LandStudies, Inc.

Equipment Operators: Gleim Environmental

Project Description: 750 feet stream channel restoration using FGM

Construction/Completion: 2000

Sinnemahoning Creek - Bennett Branch, Clearfield County

Bennett Branch Streambank Stabilization - Reach 1

Sponsors: Bennett Branch Watershed Association, Canaan Valley Institute, USFWS

Funding: Growing Greener Grant

Design: USFWS

Project Description: This project will stabilize 200 feet of bank.

Completion/Construction Date: Fall 2001

Reach 2

Sponsors: Bennett Branch Watershed Association, Canaan Valley Institute, USFWS

Funding: Growing Greener Grant

Design: USFWS

Project Description: This project will stabilize 1000 feet of bank.

Completion/Construction Date: Fall 2001

Reach 3

Sponsors: Bennett Branch Watershed Association, Canaan Valley Institute,
Funding: CVI, Growing Greener Grant
Design: Gannett Fleming
Project Description: This project will stabilize 1700 feet of bank.
Completion/Construction Date: Fall 2001

Reach 4

Sponsors: Bennett Branch Watershed Association, Canaan Valley Institute, USFWS
Funding: Growing Greener Grant
Design: USFWS
Project Description: This project will stabilize 1500 feet of bank.
Completion/Construction Date: Fall 2001

Spring Creek, Centre County

Spring Creek Watershed Assessment

Sponsor: State College Trout Unlimited Chapter
Funding: DEP Section 319, EPA
Design/Build Contractors: LandStudies, Inc.
Project Description: Assessing 20 plus stream miles for bank full calibrations at gauge stations, prioritizing restoration projects, and collecting channel features throughout the watershed.
Completion/Construction: 2001

Spring Creek Restoration

Sponsor: Clearwater Conservancy
Funding: DEP Section 319, EPA
Design/Build Contractors: Andropogon Associates, Ltd., LandServ, Inc.
Project Description: 300 feet of stream channel restoration on public park/historic site property in cooperation with PA Military Museum in Boalsburg.
Completion/Construction: 2001

Spring Creek - Buffalo Run tributary, Centre County

Buffalo Run Stream Restoration

Sponsor: SEDA Council of Governments
Funding: PennDOT
Design: Skelly and Loy Inc.
Project Description: Approximately 1,000 feet of stream improvements were designed for Buffalo Run using a natural channel design approach. The improvements are planned to fulfill mitigation permit requirements for railroad improvements along the Buffalo Run corridor. The stream supports a wild brown trout population. The site design and permits have been completed with construction scheduled for the summer of 2001. The project includes installation of rock vanes, "J" hook vanes, cross vanes, root wads, bank grading, channel shaping and riparian plantings.

Buffalo Run Stream Restoration

Sponsor: State College Trout Unlimited Chapter

Funding: DEP Section 319, EPA

Design/Build Contractors: LandStudies, Inc.

Project Description: Complete 650 feet stream restoration using FGM techniques

Completion/Construction Date: 2001

Spring Creek, Dauphin County

Watershed Assessment / Restoration

Sponsor: Trout Unlimited, Doc Fritchey Chapter

Funding: Growing Greener grant

Design: Skelly and Loy, Inc.

Project Description: Assessment for eleven square mile urban watershed in Harrisburg area. Assessment includes identifying impairments and stream types using FGM classification and GIS, development of a regional hydraulic curve, bank erosion monitoring, storm water facility identification, restoration priorities and natural stream channel design demonstration.

Completion/Construction: Current

Sugar Creek, Bradford County

Sugar Creek Restoration Project

Sponsor: US Fish and Wildlife Service, Bradford County CD

Funding:

Designer: USFWS

Equipment Operators: Gleim Construction

Project Description: Severely eroded banks exist in the town of Troy where Sugar Creek flows adjacent to several businesses. Rock structures were used to stabilize the channel and stop bank erosion. Two project areas stabilized 300 feet and 500 feet respectively.

Construction/Completion: 2001

Towanda Creek, Bradford County

Towanda Creek Restoration Project

Sponsor: US Fish and Wildlife Service, Bradford County Conservation District

Funding:

Designer: USFWS

Equipment Operators: Gleim Construction

Project Description: **Site 1** is a 1,700 foot reach. Rock structures were used to stabilize banks at a bridge and to insure movement of bed load through the stream on this reach. **Site 2** is located along Landon Orchard, where 1,500 feet of stream channel was restored to proper width and depth. Rock structures were used to stabilize banks and to insure proper bed load movement.

Construction/Completion: Planned

West Branch Octoraro Creek, Lancaster County

West Branch Octoraro Creek Restoration Project

Sponsor: Octoraro Watershed Association

Funding: DEP Section 319, EPA

Design\Build Contractors: LandStudies, Inc.

Project Description: 1,750 feet stream restoration completed using FGM. The bendway weirs previously installed on this reach of the Octoraro Creek were not successful.

Completion/Construction: 2001

Wyalusing Creek, Bradford County

Wyalusing Creek Restoration

Sponsors: Wyalusing Creek Watershed Association, Wyalusing Borough

Funding: Growing Greener Grant, Taylor Packing Co.

Design: USFWS, Dover Habitat Restoration, LLC, Steady Stream Hydrology, Hawk Engineering.

Project Description: **Phase I** includes the design and installation of rock vanes. **Phase II** involves stream restoration over a one mile of stream reach which has a drainage area of approximately 200 square miles.

Completion/Construction: Planned

Delaware River basin

Brock Creek, Bucks County

Brock Creek Watershed Assessment / Restoration

Sponsor: Lower Makefield Township

Funding: DEP Section 319, EPA

Design: Skelly and Loy Inc.

Project Description: Assessment of seven square mile highly urbanized watershed. Streams assessed using FGM methodology. GIS map developed for location and condition of streams and tributaries, regional hydraulic curve developed, bank erosion monitored, restoration plan priorities developed, and design / permitting of restoration projects.

Completion/Construction: 2001

Manatawny Creek, Montgomery County

Manatawny Creek Restoration

Sponsors: Philadelphia Academy of Natural Sciences

Funding: Growing Greener Grant

Design: USFWS, Philadelphia Academy of Natural Sciences

Construction: USFWS, local contractors

Project Description: Stabilize approximately 300 feet of vertical eroding stream banks.

Completion/Construction Date: Summer/Fall 2001

Wyomissing Creek, Berks County

Wyomissing Creek Stream Restoration

Sponsor: PA Department of Transportation (PennDOT)

Funding: PennDOT

Design: Skelly and Loy, Inc.

Project Description: Approximately 13,000 feet of stream improvements made using FGM methodology. Stream channel and bank was restored using J- hook rock vanes, cross vanes, and root wads, stream bank grading, and riparian plantings.

Completion/Construction: Summer 2001

Appendix B

Bio-engineering Stream Restoration Projects¹³

Site	Location	Status	Features
UNT on Stolfus Farm	Lancaster	completed Sp. '93	Soil-bio training site
Conestoga Scout Camp	Somerset	completed Fall '93	Soil-bio training site
Bluff Run	Mercer	completed Fall '93	Soil-bio training site
Sawkill Creek	Pike	completed Fall '96	Live stakes, rock toe
UNT on Zell Farm	Dauphin	completed Sp. '97	Soil-bio training site
UNT on Fisher Farm	Dauphin	completed Sp. '97	Soil-bio training site
Lynch Park	Greensburg	completed Sp. '98	Soil-bio training site
Montgomery Cty. Park	Phoenixville	completed Sp. '98	Lv. stks., veg. geogrids
Goose Creek	West Chester	completed Sp. '98	Lv. stks., veg. geogrids
Conewago Creek	Adams	completed Sp. '99	Root wads, seedlings
Plum Run	West Chester	completed Sp. '99	Lv. stks., veg. geogrids
French Creek	Wattsburg	completed Sp. '01	Root wads, lv. stks.
French Creek	Wattsburg	underway	Root wads, vanes
Hellam Borough, Phase	York	completed Sp. '99	Lv. stks., veg. geogrids.
Hellam Borough, Phase II	York	completed Sp. '00	Lv. stks., veg. geogrids
Spring Run	Altoona	completed Sum. '01	Lv. stks., rock toe
Muddy Run	Huntingdon	completed Spr. '01	Lv. stks., veg. geogrids
Aughwick Creek	Huntingdon	completed Fall '99	Rootwads, lv. stks.
Indian Creek Trail	Champion	completed Fall '99	Root wads
Tulpehocken Creek	Lebanon (Hoover's)	completed Spr. '01	Rootwads, lv. stks.
South Br Tunkhannock Creek	Factoryville	completed Sum. '00	Lv. stks., rock toe
Tinglepaugh Creek	Keystone College	completed Fall '00	Rootwads, lv. stks.
Donohoe Tributary,	Greensburg	completed Spr, '00	Soil bio. training

¹³ Provided by PA NRCS State Office, current through November 2001.

Bio-engineering Stream Restoration Projects (2)

Site	Location	Status	Features
Vandermark Creek	Milford	completed Dec. '99	Root wads, lv. stks.
Burd Run	Shippensburg, Cumberland Co.	underway	Relo., soil bio., wads, vanes
Chester Creek	Thornbury Park	completed Spr. '01	Soil bio.
Jacob's Creek	Donegal	completed Summer '01	Crossings, soil bio.
Lawshe Run	Jersey Shore	completed Spr. '01	Lv. stks., wetland
Blair Gap	Duncansville	planned for Fall '01	Soil bio.
Brush Creek	Beaver Co	planned Fall '01	Vanes, wads, lv.stks.
Chest Creek	Patton	planned Fall '01	Soil bio., wetland
Walnut Creek	Barnesboro	completed Fall '01	Lv. stks., rock toe
Little Toby Creek	Brockway	planned Fall '01	Root wads, LWD
Darby Creek	Darby	planned Fall '01	Root wads, lv. stks.
UNT Mini-Ditch	Hollidaysburg	underway	Lv. stks., rock wall
Tulpehocken Creek	Myerstown	planned Spr. '02	Urban soil bio.
UNT on Zook Farm	Mifflin County	planned Summer '02	Relocation, soil bio.
Dennis Creek	Franklin County	pending	Root wads, veg. geo's
UNT on Neffdale Farm	Strasburg	pending	Relocation, soil bio.
York College	York	pending	Urban soil bio.
Springettsbury Park	Springettsbury	pending	Soil bio.
Youghiogheny River	Sewickley Creek	pending	Vanes, wads, lv.stks
Lackawanna River	Forest City	on hold	Veg. gabions
Mill Run	Altoona	pending	Urban
Brandywine Creek	Chester County	pending	Root wads
Bennett's Branch	Cameron Co.	Consultant	Engr'd log jams, vanes
Fishing Creek	Columbia Co.	USF&WS	Vanes, root wads

Appendix C

WETLAND RESTORATION SUMMARY 1990 – 2000

Department of Environmental Protection
Bureau of Watershed Management
Division of Waterways, Wetlands and Erosion Control
October 24, 2001

YEAR	PROGRAM/AGENCY Acreage Restored/Created or Required Creation by (in acres)					Total Acres Restored	Acres Impacted		Total Net Gain or Loss per Year
	Chapter 105	PWRP	Mining	BAMR	USFWS/NRCS^		under Ch. 105**	under Mining	
1990*	32.6	#	##	35.4	0.0	68.0	-26.8	##	41.2
1991	170.6	#	##	8.0	173.0	351.6	-114.3	##	237.3
1992	252.7	#	##	34.1	98.0	384.8	-190.4	##	194.4
1993	68.1	#	##	8.5	394.0	470.6	-60.5	##	410.1
1994	73.2	#	##	12.9	420.5	506.6	-40.6	##	466.0
1995	114.3	#	84.5	9.7	629.6	838.1	-79.7	-19.9	738.5
1996	74.7	3.5	100.2	2.0	277.0	457.4	-62.8	-46.5	348.1
1997	87.9	19.5	108.4	36.8	742.8	995.4	-76.7	-15.0	903.7
1998	80.9	18.5	38.4	22.7	192.0	352.5	-71.3	-20.1	261.1
1999	63.1	8.8	21.8	10.5	132.0	236.2	-56.1	-15.0	165.1
2000	71	19.3	50.5	9.6	18.9	170.1	-53.2	-41.7	75.2
Total Acreages 1990-2000	1089.9	69.6	403.8	190.2	3077.8				3840.7
						4831.3	-832.4	-158.2	3840.7

Negative Numbers indicate loss

Average gain/year in wetlands over period of report

384.1

Average gain/year in wetlands over the past five years 1996 – 2000

350.6

* Data prior to this year is incorporated with the 1990 data.

** Data includes wetland impacts from Chapter 105 Wetlands Program and Dam Safety.

PWRP Program was initiated in 1996.

Mining data unavailable

^ The USFWS and NRCS programs were combined due to program resource sharing between the two agencies.

PWRP	PA Wetland Replacement Project
BAMR	Bureau of Abandoned Mine Reclamation
Mining	Bureau of Mining and Reclamation
USFWS	U.S. Fish and Wildlife Service Partners for Wildlife Program
NRCS	Natural Resource Conservation Service Wetland Reserve Program

Appendix D

Stream Bank Fencing Programs available in Pennsylvania

Program	Financial Compensation for Land *	Cost-share for Fence System	Cost-share for Stabilized Crossings	Requires, Pay and Installs Trees/Shrubs	Maximum/Minimum Buffer Required	Geographic Availability	
PA DEP SBFP	No	100%	100% for one	No	12'	Chesapeake Bay basin	
USDA CREP	Yes	100%	100%	Yes	35' / 180'	20 counties	
USDA CRP Continuous Sign-up	Yes	50%	50%	Yes	35' / 180'	Statewide	
CBF Habitat Stewardship	Yes	100%	Can be up to 100%	Yes	15' / 180'	Chesapeake Bay	
DU Habitat Stewardship	Yes	100%	Can be up to 100%	Yes	15' / 180'	Statewide	
USFWS Partners for Fish and Wildlife	No	50-100%	50-100%	No	None	Statewide	
USDA, EQIP	No	75%	75%	No	15'	Statewide	
Project Grass	No	75%	75%	No	15'	18 counties in southwest PA	
DCNR, Forestry-PA Stewardship	No	75%	75%	No	35'	Statewide	

Financial Compensation for Land – Programs have set maximum practice costs.

Appendix E

Pennsylvania Conservation Reserve Enhancement Program Practice Summary for Active CREP Contracts for all Program Years (1998-2002)

Number Contracts	Total Acres under Contract	Total Estimated Cost-Share	Average Cost-Share (\$/acre)	Average EI	Practice Code	Practice Acres	Total Estimated Practice Cost-share	Average Practice Cost-share
1,209	25,596.8	\$6,160,839	\$241	21				
					CP-1	15,096.9	\$2,186,303	\$145
					CP-2	6,447.5	\$1,072,457	\$166
					CP-3A	152.8	\$102,561	\$671
					CP-4D	181.7	\$124,071	\$683
					CP-8A	93.4	\$186,143	\$1,993
					CP-9	15.9	\$17,200	\$1,082
					CP-10	1,515.7		
					CP-12	133.1		
					CP-15A	53.8	\$10,767	\$200
					CP-21	574.9	\$256,673	\$273
					CP-22	1,283.6	\$2,214,164	\$1,725
					CP-23	47.5	\$90,500	\$1,905

Practice Codes

CP-1	Establishment of Permanent Introduced Grasses and Legumes
CP-2	Establishment of Permanent Native Grasses
CP-3A	Hardwood Tree Planting
CP-4D	Permanent Wildlife Habitat, Noneasement
CP-8A	Grass Waterways, Noneasement
CP-9	Shallow Water Areas for Wildlife
CP-10	Vegetative Cover – Grass Already Established
CP-12	Wildlife Food Plot
CP-15A	Establishment of Permanent Vegetative Cover (Contour Grass Strips)
CP-21	Filter Strips
CP-22	Riparian Buffers
CP-23	Wetland Restoration

This information is current as of October 15, 2001.

Appendix F

CHESAPEAKE BAY PROGRAM - FINANCIAL ASSISTANCE FUNDING PROGRAM							
COST SHARE EXPENDITURES FOR THE PERIOD 7/1/98 TO 12/31/00							
	BMP	# of Unique Contracts	Units Installed	CBP Cost Share	Owner Cost Share	Other Cost Share	Total Cost
1	Permanent Vegetative Cover	7	100.00 Acres	\$14,527.99	\$112,405.92	\$0.00	\$26,933.91
2	Animal Waste Management System	221	221.00 Systems	\$3,843,013.34	\$2,799,019.69	\$886,892.51	\$7,528,925.54
3	Stripcropping & Contour Farming System	16	405.30 Acres	\$73,668.49	\$18,443.09	\$0.00	\$92,111.58
4	Terrance System	21	44,889.00 Feet	\$85,457.11	\$28,376.01	\$0.00	\$113,833.12
5	Diversion System	39	24,060.00 Feet	\$74,538.94	\$24,331.30	\$945.00	\$99,815.24
6	Grazing Land Protection System	44	928.39 Acres	\$274,901.59	\$99,476.25	\$23,699.33	\$398,077.17
7	Waterway System	95	11,712.70 Feet	\$237,046.65	\$78,696.61	\$4,621.00	\$320,364.26
8	Cropland Protection System	2	92.00 Acres	\$1,104.00	\$717.39	\$0.00	\$1,821.39
9	Cropland Tillage System	2	54.50 Acres	\$5,183.27	\$1,295.82	\$0.00	\$6,479.09
10	Stream Protection System	33	2,103.00 Feet	\$77,365.39	\$27,432.02	\$13,342.56	\$118,139.97
11	Permanent Vegetative Cover on Critical Areas	12	40.40 Acres	\$28,409.91	\$8,042.35	\$1,827.00	\$38,279.26
12	Sediment Retention/Water Control Structure	23	23.00 Systems	\$30,786.30	\$16,334.30	\$1,125.00	\$48,245.60
13	Soil & Manure Analysis	13	47.00 Each	\$1,195.44	\$471.00	\$0.00	\$1,666.44
16	Barnyard Runoff System	118	80.00 Each	\$1,510,808.49	\$675,651.77	\$62,422.00	\$2,248,882.26
17	Composting	1	1.00 Each	\$15,840.00	\$3,960.00	\$0.00	\$19,800.00
GRAND TOTALS:				\$6,273,846.91	\$3,794,653.52	\$994,874.40	\$11,063,374.83

CHESAPEAKE BAY PROGRAM - FINANCIAL ASSISTANCE FUNDING PROGRAM NUTRIENT REDUCTIONS AND COST SHARE EXPENDITURES, BY BMP Fiscal Years 1986-1998													
BMP	Number of Contracts	Units Installed		Acres Treated	Total N	Available P ₂ O ₅ (lbs)	Available K ₂ O (lbs)	Erosion Reduction (tons)	Sediment Reduction (tons)	State Cost Share	Owner Cost Share	Other Cost Share	Total Cost Share
Permanent Veg. Cover	44	758	Acres	706	16,431	2,214	3,000	4,828	2,891	\$59,256.62	\$39,134.82	\$0.00	\$98,391.44
Animal Waste Management	899	892	Systems	947	808,620	705,621	1,088,295	3,904	25,488	\$19,096,568.82	\$11,690,399.89	\$2,033,846.79	\$32,820,815.50
Stripcropping Systems	141	14,211	Acres	5,339	106,013	6,073	9,961	35,356	19,540	\$284,758.62	\$100,660.02	\$1,537.13	\$386,955.77
Terrace Systems	128	451,080	Feet	2,862	128,494	8,031	10,948	37,811	23,564	\$822,515.15	\$287,618.23	\$7,687.67	\$1,110,946.55
Diversion System	164	176,329	Feet	1,628	50,813	16,155	32,088	12,984	8,909	\$277,593.04	\$86,948.24	\$2,167.07	\$366,708.35
Grazing Land Prot. System	113	1,945	Acres	1,554	25,388	10,117	18,290	3,394	2,870	\$385,956.16	\$141,686.10	\$24,754.34	\$552,396.60
Waterway System	310	359,002	Feet	848	97,981	7,166	14,367	21,368	16,024	\$789,911.68	\$263,849.92	\$24,155.17	\$1,077,916.77
Cropland Prot. System	48	1,972	Acres	1,959	17,080	1,090	1,379	5,591	3,148	\$21,161.94	\$10,166.26	\$0.00	\$31,328.20
Conservation Tillage	31	1,969	Acres	1,972	21,018	989	1,506	7,863	3,871	\$25,657.52	\$8,864.43	\$0.00	\$34,521.95
Stream Prot. System	76	105	Systems	134	13,942	3,704	6,271	1,623	2,130	\$131,979.03	\$51,398.76	\$9,922.57	\$193,300.36
Perm. Veg. On Critical Area	92	161	Acres	131	4,957	680	604	1,096	878	\$38,373.71	\$31,409.93	\$165.08	\$69,948.72
Sediment & Water Control	110	167	Systems	319	22,409	5,841	11,222	3,295	2,675	\$236,674.05	\$88,194.51	\$2,784.59	\$327,653.15
Soil & Manure Analysis	323	2,709	Numbers	133	0	0	0	0	0	\$14,938.60	\$6,413.92	\$0.00	\$21,352.52
Fertilizer Management	1	0	Acres	47	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Nutrient Management Plan	444	62,641	Acres	62,781	1,836,671	2,180,984	2,478,249	0	0	\$0.00	\$0.00	\$0.00	\$0.00
TOTALS:				81,360	3,149,817	2,948,665	3,676,180	139,113	111,988	\$22,185,345.00	\$12,806,745.00	\$2,107,020.00	\$37,092,236.00

The Bay Watershed Model estimates impact of nutrient and sediment reduction efforts in Pennsylvania's portion of the Bay drainage by multiple programs including those funded by the Commonwealth's Bay Implementation Grant. Over a 15-year period of analysis, the model has predicted Pennsylvania's agricultural efforts has reduced total nitrogen by 10,455,232 pounds, total phosphorus by 271,076 pounds, and sediment by 96,505 tons.

10-Year Average Loads for Agriculture Delivered from PA to the Bay (March 20, 2001 Model Scenario)

	Total N	Total P	Sediment
Year 1985	67,759,152	2,425,311	932,041
Year 2000	57,303,920	2,154,235	835,536
Difference	-10,455,232	-271,076	-96,505
% Difference	-18%	-13%	-12%

Appendix G

DEP Streambank Fencing Accomplishments

	1994-6/30/01	7/1/00-6/30/01
Miles of Stream Protected	84.8	13.8
Acres of Riparian Habitat Protected	867.82	163.9
Number of Cattle Managed	13,276	2,824
Number of Farms Participating	212	46
Average Cost Per Mile of Stream	\$20,036	\$27,173
Average Cost Per Farm	\$8,014	\$8,152
Total Project Costs	\$1,699,113.48	\$375,000

Appendix H

Watershed Restoration Action Strategies (WRAS)

SWP Code	WRAS on WEB?	Watershed Name	DEP Region	Problem Type
2E	Y	Pidcock/Mill Creeks	SE	Urban
2F	Y	Neshaminy Creek	SE	Urban AG
3A	Y	Upper Schuylkill River	NE	AMD Septic
3B	N	Maiden Creek	SC/NE	AG Urban
3C	N	Tulpehocken Creek	SC/SE	AG Urban
3D	Y	Manatawny/ French Creeks	SC/SE	Mixed
3E	Y	Perkiomen Creek	SC/SE	AG Urban
3F	Y	Lower Schuylkill River	SE	Urban
3G	Y	Darby/Crum Creeks	SE	Urban
3H/I	Y	Christina River	SE	AG/Urban
3J	Y	Poquessing/Pennypack Creeks	SE	Urban
6B	Y	Mahanoy/Shamokin Creeks	NC/SC/NE	AMD
6C	Y	Mahantango/Wiconisco Creeks	NC/SC/NE	AMD AG
7B	Y	Conodoguinet Creek	SC	AG Urban
7C	N	Clark/Stony Creek	SC	Urban
7D	Y	Swatara Creek	SC	AMD AG
7F	N	Conewago Creek (West)	SC	AG Urban
7G	N	Chickies Creek	SC	Mixed
7H	N	Codorus Creek	SC	AG Urban
7J	Y	Conestoga River	SC	AG Urban
7K	Y	Pequea/Octoraro Creeks	SC/SE	AG Urban
8B	N	Chest/Anderson Creeks	NC/SW	AMD
8C	N	Clearfield Creek	NC/SW	AMD
9C	N	Bald Eagle/Spring/Beech Creeks	NC	Urban AG AMD
11A	N	Frankstown Br/Juniata River	SC	Urban AG AMD
13C	N	Conococheague Creek	SC	AG
17C	N	Redbank Creek	SW/NW	AMD
18B	N	Kiski River	SW	AMD
18D	Y	Conemaugh River/ Blacklick Creek	SW	AMD
18E	Y	Stony Creek/ Little Conemaugh River	SW	AMD AG
19D	N	<i>Lower Youghiogeny River</i>	SW	AMD Urban AG
19E	Y	Upper Youghiogeny River	SW	AMD
19G	N	Whiteley Creek	SW	AMD
20D	N	Raccoon Creek	SW	AMD
20F	Y	Chartiers Creek	SW	AG Urban AMD

Appendix I
EQIP Summary 2001

GEOGRAPHIC PRIORITY AREA	FINANCIAL ASSISTANCE 1997	FINANCIAL ASSISTANCE 1998	FINANCIAL ASSISTANCE 1999	FINANCIAL ASSISTANCE 2000	FINANCIAL ASSISTANCE 2001	FINANCIAL ASSISTANCE 2002	GPA TOTALS
Neshaminy Creek (Bucks County)	\$80,000	\$180,000	\$129,268	\$130,000	\$142,000	\$141,000	\$802,268
Chickies Creek (Lancaster, Lebanon Counties)	\$130,000	\$300,000	\$217,780	\$220,000	\$232,000	\$232,000	\$1,331,780
Middle Creek (Synder County)	\$0	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$400,000
Evitts Creek (Bedford County)	\$40,000	\$52,000	\$52,000	\$0	\$0	\$0	\$144,000
Tunkhannock Creek (Susquehanna & Wyoming Counties)	\$0	\$300,000	\$213,780	\$215,000	\$227,000	\$227,000	\$1,182,780
Pigeon Creek-Pike Run (Washington County)	\$80,000	\$150,000	\$106,890	\$107,000	\$119,000	\$118,000	\$680,890
Ten Mile Creek (Washington County)	\$0	\$150,000	\$106,890	\$107,000	\$119,000	\$118,000	\$600,890
Codorus Creek (York County)	\$125,000	\$240,000	\$171,024	\$172,000	\$172,000	\$92,000	\$972,024
Crooked Creek Cowanshannock Creek (Indiana & Armstrong Counties)	\$140,000	\$300,000	\$213,780	\$215,000	\$227,000	\$226,000	\$1,321,780
Chillisquaque Creek (Northumberland, Montour, & Columbia Counties)	\$120,000	\$150,000	\$106,890	\$107,000	\$119,000	\$118,000	\$720,890
Shamokin-Mahonoy Creek (Northumberland County)	\$80,000	\$200,000	\$142,520	\$145,000	\$157,000	\$156,000	\$880,520
Upper Monocacy (Adams County)	\$0	\$217,000	\$154,634	\$150,000	\$150,000	\$149,000	\$820,634
Conodoguinet Creek (Cumberland County)	\$120,000	\$138,000	\$100,494	\$101,000	\$113,000	\$112,000	\$684,494
Subtotal of GPAs	\$915,000	\$2,457,000	\$1,795,950	\$1,749,000	\$1,857,000	\$1,769,000	\$10,542,950
STATEWIDE RESOURCE							

CONCERNS							
Livestock & Poultry	\$833,676	\$472,125	\$338,380	\$400,000	\$500,000	\$361,335	\$2,905,516
Crop	\$398,522	\$372,075	\$265,870	\$218,200	\$292,400	\$194,565	\$1,741,632
Subtotal of Statewide Concerns	\$1,232,198	\$844,200	\$604,250	\$618,200	\$792,400	\$555,900	\$4,647,148
1997 - 1998 Modifications					\$50,000	\$50,000	\$100,000
Total -- GPAs & Statewide	\$2,147,198	\$3,301,200	\$2,400,200	\$2,367,200	\$2,699,400	\$2,374,900	\$15,290,098